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A FUEL DEBATE

AT the instigation of its Founder-President, Sir Frederick J. West, the North West Fuel Luncheon Club staged this month a debate on 'The Most Efficient Use of the National Fuel Resources.' Sir Frederick himself was elected to act as the impartial Chairman. Speakers were chosen to put the case for coal, gas, and electricity respectively and while no one would expect less than a benevolent impartiality towards gas from such a Chairman, no one would expect less than scrupulous fair play and in the summing-up a ripe wisdom in dealing with the issues under debate.

The order of 'batting' was decided by lot and coal went in first. Mr. S. N. Duguid, than whom no one in Manchester is better fitted to speak on this subject, repeated what has now become almost a cliché—coal is supreme in the national economy, to waste it is criminal. He stressed the necessity for a national fuel policy. In regard to the use of coal he made five points. It would help efficiency if the purposes for which each class of fuel, whether raw coal, gas, or electricity, is suited were more clearly defined. The indifference of consumers to coal economy must be overcome. It was advantageous to maintain consistency in the quality of coal supplied for use in each particular class of appliance. Collieries must design their boiler grates to use the lowest possible grades of coal. Managers should ensure first class maintenance, full instrumentation, and thorough training of stokers and other fuel using operatives.

The advocate for electricity, Mr. A. J. Emery, curiously enough opened up with atomic power, which, he contended, would be made available to industry only by way of electricity generation. Coal was much too valuable to be tied up with electricity! But he devoted most of his time to the domestic uses of electricity and although we in the gas industry have heard all this before we cannot neglect the arguments put forward. Gaily ignoring the efforts of his industry to keep gas out of new housing schemes, he maintained that the choice of fuel should be left to competition. Mr. Emery had provided himself with a bag containing 4 lb. of boiler slack. With this he could generate four units of electricity which would do all the cooking for four people for a day. Could you do that with this 4 lb. of slack burned in the kitchen range? And then what could you not do with electricity? It would give you hot water when and where you required it and while he made no claim for space heating one wondered, why the modesty? You could keep warm in bed with an electric blanket, there was nothing finer than an electric kettle or toaster, while for entertainment, radio, television, it was indispensable. What was efficiency? The claim was that electricity minimises work in the home and that without any fouling of ceilings or utensils. And the housewife, to a woman, prefers the electric cooker every time. A subsequent speaker, in support of this thesis, made the subtle point (though again by no means new) that as you must have electricity in the house for certain indispensable services, why should it not do all the rest of the heating work? This speaker claimed the great superiority of the immersion heater for hot water supply. And comic relief was provided by a quotation of H. G. Wells, prophecying for 2000 A.D., in which the boy asking 'what was this gas of the ancients?' was told that it was a smelly stuff used for heating and cooking before the electrics took charge!

The case for gas was in the capable hands of Mr. G. F. Ward. He ridiculed the idea that gas was out of date. He supposed some people still had the notion that the gasworks was a filthy, smoky, tumbledown place whereas in fact the modern gasworks was as clean, as fully mechanised and as highly scientific in control as any industrial plant of the day. He must remind his electrical friends of the high thermal efficiency, from coal to user, of the gasworks process. Gas was produced at the works with 80% efficiency and used with 60% efficiency, making an overall figure of 48%. Electricity was generated with 26% efficiency

and even if the claim of 100% efficiency of utilisation was admitted, they still had the comparison, 48 to 26 in favour of gas. Gas did not fear competition. Freedom of choice had been promised to the householder by the first Minister of Fuel and Power, but this had been sabotaged by what he presumed was the high-pressure sales policy of the electrical industry —or were they afraid of competition? There was no doubt that electricity was favoured by the powers that be. They could take one figure alone to show this. In the year 1949 the allocation of capital to power station new construction was £114 mill., whereas to gas only £34 mill. was allocated. When was this insane competition among the fuel industries to stop? Surely there was the most pressing need for a national fuel policy.

The battle raged up and down the room and the protagonists of gas made a very creditable show. We have been in this account more concerned to stress the points made against gas than for it—for obvious reasons. Even the members for coal admitted that coal suitable for carbonisation should be exclusively allocated to the carbonising industries. Much play was made on both sides, for the battle was one mainly between gas and electricity, of the supposed preference of the housewife for one or the other. More than one speaker, however, contended that the allocation of duties as between one form of fuel or energy and another was a task for competent technicians among which the housewife could not be included. Among the good debating points made was that one would not need an electric blanket if the whole house was decently warmed.

The place of oil in all this was put in a short statesmanlike speech by Dr. Kind, well known in Manchester in the oil refinery industry. Coal, he said, was getting scarce, labour costs in the mines were rising more rapidly than anywhere else, the price of coal per calorie was going up. They should remember that crude oil was produced for from £2 to £2 10s. per ton and though transport charges were heavy its cost per calorie in this country was not so high as to put it out of consideration. There was also the point that the tendency was to refine the crude oil in this country with the result that by-products in the form of rich gases would be available.

The Chairman rose to sum up. He would be as impartial as he could. But he must say that gas did not fear competition. What they objected to was unfair competition. When he was told that the electricians were installing their service at £2 per house while gas required £10, he submitted that these figures bore no relation to the relative costs. Speakers had generally agreed that there was a lack of policy in the use of the several forms of fuel. The question was, however, how to deal with the people who consumed gas or electricity without regard to the quantity available. He suggested that, difficult as it may seem, gas and electricity must be rationed as coal is rationed. This had been successfully done in Germany; he believed it could be done here. For instance, it might be advisable to charge five or six times the normal price for therms or units consumed above a fairly assessed quarterly allocation. Supply might be cut off entirely to those consumers who persisted in exceeding their ration. He was convinced that people would not be persuaded to economise voluntarily, especially in the winter. He was convinced that some such effort would be found necessary. Shortages of electricity, particularly, in the next few winters, would cost industry millions of pounds, with serious effects on our national productive capacity.

This after-luncheon debate provided an hour's most enjoyable entertainment to a group of fuel technologists in Manchester. But we suggest that it was much more than that. It was a demonstration of the growing disquiet among those who know something of the problem at the apparent apathy in the highest quarters towards this vital national question. We noted in these columns recently that the Minister has now appointed the Chairman and three members, the beginnings of a Committee to 'help him in an advisory capacity' in improving the efficient use of fuel. The names of these experts (they are all much more than that) command the very highest respect among fuel technologists, but the very lukewarmness with which the announcement was made inspires little confidence that the Ministry is even yet seized with the urgency of the matter. Without vision the people perish, without coal we starve.

GOODWILL AND RESTRAINT

WHILE it would be idle to pretend that there are no differences between the organisations of gas officers and senior and junior staffs which have flourished particularly since vesting day it would be no less wide of the mark to claim that there has been any marked change in industrial relations compared with the years of private enterprise, when the only negotiating machinery was the Joint Industrial Council. The gas industry has always been proud of the good relations existing between employers and workers of all grades, and it has only been the trend towards larger concentrations, culminating in nationalisation and the appointment of the largely autonomous area boards, that has necessitated the formation of organisations of officers and staff, as comprehensive in their respective spheres as are the trade unions representing the manual workers, to represent to the Gas Council and the area boards, through joint councils, the interests of that large body of men and women comprising technical, clerical, and administrative interests on whose loyal and contented service the industry largely relies.

In recent months we have recorded the activities of the Gas Officers' Guild and the National Association of Local Government Officers, and in other pages of this issue we report the annual conference of the British Gas Staff Association, whose membership in 1950 increased by 950 to a new record total of 16,900. The first we heard of gas staff associations was in 1944, and it was as recently as 1946 that we reported the consummation of negotiations between local organisations in the formation of the British Gas Staff Association, whose structure

today is approximately comparable with that of the industry itself. It has a national council, an area council in each of the 12 gas board areas, and a large number of local branches, whose views and opinions are transmitted to the national council through the area councils. In his inaugural address at the annual conference, Mr. W. E. Webb admitted that there had been some 'differences' with Nalgo but he hoped these had been satisfactorily settled in an agreement into which the two bodies had entered.

Mr. Webb referred to 1950 as a year of collaboration, goodwill, and restraint, and while he claimed a large measure of success for the Association he confessed to one or two disappointments, notably the fact that it had been omitted from representation on the senior grade staff council which had been set up. The Gas Council had felt that the Gas Officers' Guild and Nalgo adequately represented the staffs concerned, but Mr. Webb had made a personal appeal—which Colonel Smith had said would be given consideration—on the grounds that senior grade members had been in the B.G.A. from its inception, and that with the passage of time many younger members would pass into senior grades and would not wish to leave the Association in which they had spent the years of their youth. Our impression of the conference—and we have followed the activities of the Association fairly closely over the years—was that the B.G.S.A. has successfully survived its teething troubles and is facing its problems with a sincere desire to promote the good of the industry.

INCENTIVE

IF proof were wanted of the wisdom of converting the district associations into district sections of the Institution of Gas Engineers it was forthcoming in the announcement at the Birmingham meeting of the Midland Section on April 6 that 125 new and re-joining members had sought and obtained enrolment since the last meeting. Moreover, the attendance was one of the largest in the long history of the old Midland Association, and the meeting and the luncheon which preceded it were symptomatic of new enthusiasm. Unlike the organisations in Scotland and Wales which for geographical reasons are almost entirely composed of members within a single area, the Midland Section draws its membership from no fewer than four areas. and for three years in succession has appointed a chairman from a different area—Mr. S. J. Sadler from the West Midlands, Mr. K. L. Pearce from the East Midlands, and now Mr. Alexander Tran from the Southern. Members enjoy the great advantage of being able to compare the set-up in the different areas, and, incidentally, they are not always entertained by the same hosts. Those who act as hosts at one meeting are honoured and welcome guests at the next. We would not go so far as to say there is rivalry in the lavishness of the hospitality offered, though we would, in anticipation of an enjoyable summer visit to Oxford, compliment the Southern Gas Board on extending an invitation to the ladies—for the first time within our memory of the Midland Association.

In his presidential address, which will be published in a later issue, Mr. Tran followed the pattern of his predecessor in detailing the set-up of the division for which he is personally responsible, and laid emphasis on the large measure of decentralisation that had been achieved. The recently issued reports of the Gas Council and the area boards emphasised that the gas industry is the most decentralised of all the nationalised industries. The area boards are practically autonomous, and free to develop their own systems of administration. In the Southern area, where Mr. Tran says 'our lot has fallen in pleasant places,' decentralisation has been carried down to the lowest practical level, and the temptation to build large headquarters and divisional staffs has been resisted. Such staffs are, in the short run, an extra load which the industry has to bear. No doubt in the long run they will more than save their cost, and they must be judged by that test. Incentive is given to management at all levels to discharge their duties not only in a way which will satisfy those who have supervision over them, but in a way which will satisfy themselves. The whole industry will agree with his remark that there is no better way of getting affairs conducted responsibly than to make people feel responsible for conducting them. Nothing can take the place of the man on the spot, but he is useless unless he can act on the spot and know that his decisions will be upheld. In accordance with tradition the address was not open to discussion, but Mr. J. E. Wakeford, who in due time will follow Mr. Tran into the chair of the Section, remarked in proposing a vote of thanks that in every area there should be a long term plan to enable the men further down the scale to know not only what was their goal, but the appropriate route to take to reach it.

The luncheon was marked by a representative attendance, notable among whom were the President of the Institution of Gas Engineers, the Chairmen of the West and East Midlands Gas Boards and the Deputy Chairmen of the North Eastern and Southern Gas Boards, both of whom spent some of their earlier professional years at Birmingham. It was an occasion for some complimentary remarks on the reports of the Gas Council and the area boards which, as Mr. Diamond remarked, constituted the first factual representation and picture of the gas industry they had ever had. We missed the cheerful presence of Mr. George Matthews, who retired a few months ago from the Deputy Chairmanship of the West Midland Board, and on enquiry we learned that the Minister of Fuel and Power had not yet made a new appointment in his stead.

NEW LAUNDRY EQUIPMENT

ONE of the most noticeable features of post-war housing, particularly in the London area, is the increasing popularity of blocks of flats as opposed to ordinary houses. These flats have provided opportunities for interesting developments in communal facilities—notably laundries. The normal practice has been to install washing machines of the Bendix type, supported by a hot water installation,

usually gas-fired. The principal difficulty encountered with this type of installation, apart from the considerable expense, was the frequent inability of the washing machines, designed as they are for occasional domestic use, to stand up to the rigours of almost continuous service. The *Journal* is able to reveal that a new factor is about to appear on the scene, a two-fuel washing machine, using gas for water heating and electricity for agitation, and specifically designed for heavy duty work. The machine takes 20 lb. of dry wash, with an additional overload margin of 7 lb. The washing process takes place during the whole of the time the water is heated from cold to 175°F., which takes about 35 minutes. Gas consumption is 90 cu.ft. per hour. The washing machine is complemented by a compact hydro-extractor, which extracts 60% moisture from the clothes in five minutes. Both these machines are of Swedish origin and are to be marketed in this country by Electrolux, Ltd. At an exclusive preview of the equipment at the pilot laundry recently installed at their Luton works, we also had an opportunity of examining a new 75 cu.ft. per hour drying cupboard which has been developed by the South Eastern Gas Board for use in communal laundries and laundrettes. The advent of new gas-consuming equipment into this important and growing field will, we believe, be noted with satisfaction by the industry and may well have far-reaching results.

Personal

Mr. C. B. S. Mitchell, District Manager at Ayr, has been appointed Deputy Group Manager of the Kilmarnock Group, Scottish Gas Board.

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Mr. Athol W. Brown, District Manager at Alloa and Hon. Secretary and Treasurer of the North British Association of Gas Managers, has been appointed Deputy Divisional Controller of the Scottish Gas Board's Northern Division.

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Mr. Robert J. H. Clark, formerly Chief Engineer of the Plymouth and Stonehouse Gas Light and Coke Company and latterly Sub-Divisional Manager, South Western Gas Board, has retired after nearly half a century of service to the gas industry, and is succeeded by **Mr. J. W. Dean.** Numerous presentations have been made to Mr. Clark by the Southern Division Executive Committee; sub-divisional officers, station engineers, and unit controllers of the Plymouth and North Cornwall Sub-Division; his associates of the former Plymouth Company at Coxside works; and works department employees there. Mr. Clark began his career as an articled pupil of the late Mr. P. S. Hoyte at Coxside in 1903. After qualifying as a gas engineer he filled various positions on the Plymouth Company's staff until, in 1928, he succeeded Mr. Hoyte as Chief Engineer. When the industry was nationalised in 1949, Mr. Clark was appointed Manager of the Plymouth and Cornwall Sub-Division.

Obituary

The death occurred on April 18 of **Alderman A. C. Warwick,** J.P., Chairman of the South Eastern Gas Consultative Council since its formation in September, 1949, and part-time member of the South Eastern Gas Board. The funeral took place on Monday, at the Honor Oak Crematorium, Forest Hill.

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Mr. James Shiell died at Innerleithen on April 11 in his 85th year. After being Manager at Comrie, Moffat, and Berwick-on-Tweed he was appointed Manager at his home town of Innerleithen and this post he held for 36 years, retiring in 1939 when he was succeeded by his son, Mr. E. Shiell. Mr. Shiell was well known in the Scottish borders as a craftsman engineer and an expert fisherman, and in his youth he was a good rifle shot and a pioneer cyclist and motor-cyclist.

Widespread sympathy will be extended to Mr. H. D. Greenwood (Carbonisation Branch, N.C.B.) and Mrs. Greenwood in the loss of their only son, **Lieut. Jeffrey Langdon Greenwood,** R.N., aged 22, while on duty as an officer of H.M. Submarine Affray.

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Mr. Henry James Randall, who recently retired after 36 years' service with the Camberley undertaking, died suddenly at his home at 12, Park Avenue, Hove, on April 20. Fourth son of Mr. James Randall, of Tottenham, he was for five years with S. Cutler and Sons, Ltd., and spent some time at the works of the old Harrow Gas Company before going overseas in 1905 as Superintendent of the Woodstock station of the Cape Town and District Gas Company. Appointed Works Manager at Camberley in 1915, he later became Managing Director and Engineer of the old Yorktown (Camberley) and District Gas and Electricity Company. On nationalisation he was appointed General Manager of the Southern Group, Central Division, Southern Gas Board, and continued to act as General Manager at Camberley.

Diary

April 26.—North Thames Gas Consultative Council: Westminster City Hall, Charing Cross Road, 3.30 p.m.

April 27.—Manchester and District Section, I.G.E.: First Annual General Meeting, Engineers' Club, Albert Square, Manchester, 2.30 p.m.

April 27.—Northern Junior Gas Association: Newcastle. Address by J. R. Bradshaw, Deputy Chairman, Northern Gas Board. Visit to the Redheugh gasworks.

April 27.—North British Association of Gas Managers: Spring Meeting, Dunblane Hotel Hydro, Perthshire. (Golf Circle meeting, Dunblane Golf Course, April 26.)

April 28.—London and Southern Junior Gas Association: Tour of North Thames Gas Board Beckton trunk mains system and Westminster Control Room, 2.30 p.m.

April 30-May 11.—British Industries Fair: Gas Council Industrial Gas Conference, Queen's Hotel, Birmingham, April 30, 11.30 a.m. Gas Section at Castle Bromwich, including Gas Council and Coke Department stands.

May 1.—East Midlands Gas Consultative Council: Meeting. Victoria Station Hotel, Nottingham, 2.0 p.m.

May 1.—South Eastern Gas Consultative Council: General Purposes Committee, Grosvenor Hotel, Victoria, 2.30 p.m.

May 2.—South Western Gas Consultative Council: 34, Bridge Street, Taunton, 11 a.m.

May 3 and 4.—East Midlands Gas Board: Staff Conference, Skegness.

May 3 and 4.—Institution of Gas Engineers (Wales and Monmouthshire Section): Annual Meeting, Grand Hotel, Llandudno. 'Underground Gasification,' C. A. Masterman; 'Space Heating,' K. M. Ernest (Cardiff); 'Use of Butane,' A. D. Howells (Abergavenny); and 'Improvements in Gas-making Conditions on Small Works,' H. J. Stanley (Penmaenmawr).

May 4.—Institution of Gas Engineers (North of England Section): Annual Meeting, County Hotel, Newcastle-upon-Tyne, 11.30 a.m.

May 4.—London and Southern Junior Gas Association: 'Gas Cooling and Washing Plant,' J. B. McKean, 178, Edgware Road, W.2, 6.30 p.m.

May 10.—Midland Junior Gas Association: President's Day.

May 11.—Northern Junior Gas Association: Meeting at Newcastle; visit to Redheugh gasworks and address by J. R. Bradshaw.

May 12.—Scottish Junior Gas Association (Eastern District): Annual General Meeting at Edinburgh.

May 15.—Eastern Gas Consultative Council: Connaught Rooms, Great Queen Street, 2 p.m.

May 16.—Institution of Gas Engineers (South Western Section): Some Thoughts on the Treatment and Disposal of Gasworks Effluent,' Dr. A. Marsden. Torquay.

See also Diary in April 18 issue, p. 160.

A Transfer.—Chester-le-Street unit of the Newcastle Division of the Northern Gas Board has been transferred to Sunderland Division. It was reported that the changeover was effected smoothly.

Presentations.—Two foremen with the Middlesbrough Gas Division have received presentations on their retirement. They are Mr. George Fall, distribution foreman, with 42 years' service and Mr. Jack Thompson, foreman mains layer, with 36 years' service.

A New Tar Distillery under construction for the United Austrian Iron and Steel Works, in Linz, will have a capacity of 40,000 tons. In addition to road tar, benzole, toluole, and xylol, naphthalene, phenols, impregnating oils and other products will be made. Most of the plant will be supplied by Germany, but part is being built in Austria. The distillery should be in operation by the end of this year.

Shortage of Copper will delay the opening of the new £3 mill. I.C.I. tube-making factory now being completed on the East Lancashire road at Kirkby, near Liverpool. The plant, covering 50 acres, was to have employed 800 workers, but it will now have to stand idle until the copper shortage is eased, with only a staff for maintenance purposes. The factory is equipped to deal with semi-finished tubes manufactured by the Company at Witton, Birmingham, and the shortage of copper was one of the reasons why 250 workers at that factory had to be discharged this year. The Kirkby factory was scheduled to begin production this summer.

News in Brief

The Institution of Gas Engineers announces the publication (at 2s. 6d. per copy, post free) of the 'grey edition' of the Gas Fellowship Report, 1949-50 (Communication No. 378/179), presented and discussed at the last Autumn research meeting.

Gasworks Taken Over.—The Scottish Gas Board has taken over the three Midlothian gas undertakings of Newtongrange, Arniston, and Rosewell from the National Coal Board. The works will be included in the recently-formed Edinburgh division of the Board. Gas undertakings taken over by the Scottish Gas Board now number 197.

George Wilson Gas Meters, Ltd.—On April 10 the firm held a social event in the form of a dance at which prizes for the various winter competitions were presented. With two exceptions the cups were won by members of the staff. In the case of the table tennis contest the cup was won for the third successive year by the Managing Director, Mr. W. D. Wilson. The prizes were presented by the Technical Director, Mr. D. C. E. Poole, who emphasised the importance, which the Company attached to the social side.

Gas Services have been extended from Musselburgh by a one and a half miles of high pressure main to Wallyford, Midlothian. First use of the gas service will be for industrial purposes in the village and for the local village hall. Ultimately some 300 new houses will be linked as well as older property in this expanding mining centre.

Stoppage at Brighouse.—Technical trouble at Brighouse gasworks stopped all gas supplies in low-lying areas of the town. Messages were flashed on cinema screens, loud-speaker vans toured the streets, and instructions were broadcast over the local wireless relay system, asking people not to use naked lights when they returned home, if gas installations had been left on. On full pressure being restored on the district, lamp-lighting attendants had to re-light more than 300 street lamps.

Calor Gas (Scotland), Ltd., has now some 220 stockists and service points in Scotland. The organisation has been developed steadily over the past year and now covers virtually every part of the country. Special attention has been devoted to developing the more isolated areas and the islands of Barra, Coll, Mull and Skye have recently been given improved service. The Company reports a strong demand for dairy sterilisation purposes and for the poultry industry. Improved equipment is being introduced, one of the most attractive recent innovations being the preset-alarm Highlander cooker which warns when a dish has been cooked by the ringing of the alarm bell.

Coke Sales Circle

At a meeting of the London and Counties Coke Sales Circle at Gas Industry House on April 3 (under the Chairmanship of Mr. W. E. Daniel) Mr. G. G. Champion, Manager, Sales Section of the Coke Department, North Thames Gas Board, gave a talk on some of the changes and developments which he had seen in the course of his 40 years experience in the marketing of coke. Not only had the quantity of coke sold increased enormously, but starting in the twenties there had been a profound change in the character of the trade.

The gas industry was faced with an acute problem when the cement works, which had been very big coke users, changed over in the main to coal. Speaking of this Mr. Champion paid special tribute to the work and methods of Mr. E. W. L. Nicol in finding new business and introducing coke as a domestic fuel. Nicol was the fuel expert of the London Coke Committee which gave rise in 1931 to the London and Counties Coke Association. The work of this Association was well known throughout the country and, in Mr. Champion's view, the keynote of its success had been its close association with the merchants. In the nine years up to the outbreak of war their trade in coke had been more than doubled.

The Coke Sales Circle which now embraces producers and distributors is itself an indication that the relationship has if anything been strengthened in the last few years.

GAS EQUIPMENT IN HATFIELD'S NEW HOUSES

The first house completed for the Development Corporation at Hatfield was opened on April 7, by Mr. George Lindgren, M.P., Parliamentary Secretary to the Ministry of Local Government and Planning. Our photograph shows a corner of the well-equipped kitchen.

The house, one of the first 119 planned, is equipped with gas points for cooker, wash boiler, refrigerator, sink water heater and ignition for open solid smokeless fuel fire. An Elextrolux M.151 refrigerator and an Ascot 503 sink water heater are being installed as standard equipment in each house. The Council of Industrial Design was invited to furnish the first house completed and this will be open to the public for three weeks. The Council completed the kitchen equipment by selecting a Radiation 4180 'New World' gas cooker and a Dean 925 gas wash boiler.

LONDON JUNIORS AT FULHAM WORKS

Members of the London and Southern Junior Gas Association visited the Fulham works of the North Thames Gas Board on Saturday, April 7. Dr. A. E. Haffner (Station Engineer) is here seen with a group of visitors which includes the President, Mr. T. V. Garrud.

Gas Supplies Laundrette

A laundrette service recently opened at Falmouth is supplied by two Potterton 'Rex' 5-section boilers with a rated output of 247 gal. per hour. The storage is a 150 gal. tank.

The present quarter is the first full quarter in which the installation has been operating, and the consumption is 140,600 cu.ft. for the quarter.

The laundrette is open from 9 a.m. to 6 p.m. and is used at present by approximately 100 customers daily, although its capacity is sufficient to exceed this number appreciably.

Clock controls operate the boilers from 7 a.m. to 6 p.m. and from 9.35 a.m. to 5 p.m.

Ideal Home Results

A summary of the results recorded at the Gas Pavilion at the Ideal Home Exhibition, Olympia, shows that this year's theme 'Spring is in the Air' was a most popular one. It received a great deal of attention and favourable comment from the Press, B.B.C. sound broadcasts, television, and news reels.

The number of people inspecting the Pavilion was approximately half a million. Officials on the stand received 5,830 enquiries from potential purchasers for 6,249 gas appliances.

The innovation of a gas fitter in attendance to advise housewives on the care and maintenance of their appliances produced no fewer than 753 enquiries for instructions and advice. Enquiries were recorded from people living in the areas of supply of all twelve gas boards. Several enquiries were also received regarding export of appliances.

The official attendance at the exhibition (paid admission) was 1.168.073. This was 77,956 more than in 1950.

Hot Water and Clean Food

This new Gas Council booklet should be read by everyone concerned in the preparation, handling, and serving of food. Both employers and employees in restaurants, canteens, cafes, bakeries and food shops will find the straightforward explanation of the dangers of food contamination a sound reason for urging the strict observance of the simple rule laid down 'that hands must be kept clean at all times by washing them frequently during the day with soap and hot water.'

The contents include a note of the requirements from the Food and Drugs Act 1938, with particular reference to the use of hot water for personal hygiene, dish washing, and cleaning of premises, and a summary of the latest medical opinion on the subject. These notes are supported by illustrated examples of the latest gas water heaters.

Gas Industry Lectures

The following lectures are available through the Gas Council's lectures service. They can be illustrated, if desired, by appropriate film strips, and a lecturer can be provided.

'*Gas as a Public Service.*'—The story of the British gas industry, and how it effects everyday life.

'*The Development of the Gas Industry.*'—The early history of the British gas industry; integrating influences prior to nationalisation; structure and statutory obligations; scope and purposes of the Gas Act, 1948; relations with other public services.

'*Gas Manufacture and By-products.*'—The manufacture of gas, with special reference to the scientific extraction of chemicals from coal.

'*Making the Modern Town* (Smoke Abatement).'—The results of years of campaigning against smoke; higher thermal efficiency in factories; modern heating methods in the home, based on the use of smokeless fuels; and the obtaining, by local authorities, of powers for the creation of smokeless zones.

'*Modern Home-making.*'—Unconventional approaches to home-making brought about by modern departures from traditional housing ideas.

Each of the lectures is planned to take one hour (with or without film strip), and is given without charge. It is helpful, in making bookings, if a choice of dates can be given. The payment of travelling expenses is asked if the school, or organisation, is further than 60 miles from London.

Further lecture notes include:—

'*How Gas is Made.*'—A version for juvenile audiences.

'*Gas and the Treasure in Coal.*'—A coal products lecture for young people.

'*Gas as a Public Servant.*'—How gas is allied to the work of local authorities.

'*The Use of Gas in Planning the Modern Home.*'—Deals with the domestic uses of gas.

'*Comfort in the Home.*'—Outlines new standards of heating and ventilation.

'*How to Plan a Kitchen.*'—Shows how planning can be made to produce efficiency.

All applications concerning the lectures should be made to the Publicity Manager of the Gas Council.

Imperial Continental Gas Compensation

THE Foreign Office announced on April 12 that an agreement between the British and French Governments to regulate the compensation payable to British interests in the French nationalised gas and electricity industries has been signed in Paris. The agreement closely follows those between France on the one hand and Belgium, Switzerland, and Canada on the other.

In a circular to shareholders giving the terms, the Imperial Continental Gas Association states that its basic compensation amounts to a sterling equivalent of £2,801,000.

The Association has given certain French private interests which are owners of nationalised assets in Great Britain an exchange guarantee with a maximum liability of £300,000, thus bringing the Association's net receipt of compensation at the worst to about £2,500,000. In addition the Association may receive a further sum of about £662,000 for premium on redemption and the value of assets not nationalised. The agreement is to take effect from June 1, 1950, and provides for the payment of two annuities during 1951.

Capital repayments must be reinvested in France, but there is reason to hope that this stipulation may be waived by the Exchange Control authorities, though it is an integral part of the agreement. Only if and when the Association succeeds in converting these annuities into sterling will the Board be in a position to make proposals about the disposition of the available moneys.

AMERICAN SPOTLIGHT

Items of Topical Interest from the Contemporary Technical Press of Canada and the United States

'PLUGGING THE DRAIN'

ACCORDING to the National Safety Council, gas utilities in 1949 ranked 34th among all industries in the frequency of disabling injuries. In severity, gas utilities were 22nd from the top—just slightly better than the average for all industries. President Hulcy and the American Gas Association's Accident Prevention Committee have accepted this challenge. They have opened a concerted drive to plug the drain on manpower reserves. It will be a long-term job and a tough one—but it can be done. One of the first steps in the new programme was to provide for more publicity on accident prevention. The A.G.A. Accident Prevention Committee is greatly enlarging its services. Another step is to establish closer teamwork with regional associations and other gas industry groups.

President Hulcy appealed to the heads of all member companies to spur the safety drive by improving their individual company records. He also asked for suggestions. The response was immediate. One gas executive called for a free exchange of ideas and suggestions on accident prevention between gas company utilities, to be collected and distributed by A.G.A. 'We believe,' reported another executive, 'that all safety ideas used by the gas industry should be gathered, edited, and made available to member companies.' (*A.G.A. Monthly.*)

* * *

GAS APPLIANCES BY AIR

GAS appliances constituted the largest individual commodity classification shipped by Pan American Airways from Miami to Colombia in 1950, with cargo clippers carrying 3,651 gas ranges and 325 water heaters to the South American country during the year.

The gas ranges were about evenly divided between two burner models, weighing 165 lb., and four burner types weighing 325 lb. per unit. This million pound movement for the year required the space equivalent to 85 cargo clippers. Cargo planes can carry 40 gas ranges or more on each flight. (*American Gas Journal.*)

* * *

IGNITION DEVICES

REPORTS should be due before long on the national operating tests in which 2,000 gas ranges equipped with either automatic or single point ignition systems are being checked under conditions of actual use in the homes of consumers.

The new devices now being tested fall into two categories. The first, called the single point or flash tube system, does not eliminate the gas pilot entirely, but reduces it to one per range and relies on a slotted tube to carry the flame from a central point to the burners. The alternative is electrical ignition in which a coil is placed near the pilot burner tip.

There is no doubt the electrical device has a head start in the race for supremacy in the new and more fully automatic type of gas range ignition. Of the ranges on test about 1,200 are of this type, while the remaining 800 are using variations of the flash tube. Assuming that the tests show both systems perform satisfactorily, the American gas industry will shortly be faced with the question of which type of ignition is to receive the utility and manufacturers' support necessary to give it widespread consumer acceptance. (*American Gas Journal.*)

* * *

SPRAYING MOLTEN METAL

A NEW metalising machine which sprays molten metal has been developed at the Latex compressor station of United Gas Co., near Shreveport, La.

The business end of the machine looks like a paint spray gun. The basic operating principle is the same, but molten metal takes the place of paint, and intense heat, provided by acetylene and oxygen, is required in addition to the compressed air needed to produce the spray.

The metalising equipment provides a process of building up worn material to bring it back to standard size. It provides a means of treating moving parts with hard surface material to stand up under hard usage. It may be used in treating metal against corrosion, and rust prevention on hot pipe or mufflers—from which paint burns off quickly—has been accomplished by spraying such parts with aluminium. Brass, copper, lead, nickel, tin, zinc, and steel can be handled with equal facility. (*Gas Age.*)

* * *

A DIFFICULT JOB

A DIFFICULT gas line construction job was recently completed by the Kansas City Division of the Gas Service Co., when a 7,200-ft., 20-in. steel welded main to serve the new Hawthorn station of the Kansas City Power & Light Co., was laid.

The construction involved the building of the line under three main line railroad tracks, two railroad switch tracks, laying it under the Blue River, and over a river dike. The pipe also had to be laid on cement piers a short distance above the ground to allow for filling in of bottom land.

According to *Gas Service*, employee magazine of the company, the main construction problem was the quicksand at the bottom of the Blue River. The line was laid in the river approximately 20 ft. from the top of the river bank. At the time of construction the water was 7 ft. deep. (*Gas Age.*)

HOME SERVICE WORKSHOP

A TRUE training course was the theme of an American Gas Association Home Service Workshop held in Washington early this year. The three-day programme included top executives' viewpoint and other practical suggestions regarding all home service activities—home calls, dealer co-ordination, indoctrination of new employees, laundry trends, demonstrations, and showmanship. Thirty-four states were represented plus five from Canada.

The workshop opened with a symposium of special home service activities—all of them reported in such a way as to give possible ideas to other companies. Four demonstrations were an important part of the programme—'Platformalities,' a school demonstration, 'the Story of Frozen Foods,' and 'Showmanship in a Cooking School.' An outstanding feature was the afternoon given over to group discussion.

Social hours sponsored by equipment divisions of the Gas Appliance Manufacturers' Association provided a popular contribution to round off the proceedings.

D. A. Hulcy, President of the A.G.A., was the guest speaker at the closing luncheon conference. He urged the home service girls to aid in keeping the gas companies at their present high point in the nation's life. (*Gas Age.*)

* * *

WHEN THE SIREN SOUNDS

THE American Gas Association has supplied its member companies with a brief set of recommendations for customers in event of aid raid warning. The statement was prepared by the A.G.A. National Defence Committee. Copies of the statement have been forwarded to the Federal Civil Defence Administration in Washington for consideration and eventual use by national and local civilian defence administrators. Pending issuance of a formal statement by the Government, the present material should assist gas companies in their local civilian defence planning.

Following is the text of the A.G.A. 'Public Statement for Home Gas Users in an Air Raid Alert':

When the Alert Is On:

Do *not* turn off gas at the meter.
Do *not* turn off pilot lights.
Do turn off your gas range burners.
Do turn off non-automatic gas appliances such as manually operated water heaters or room heaters.

If an Air Raid Occurs and the Premises Are Badly Damaged:

Turn of gas at the meter if it is safe and possible to do so. Once the main gas valve is turned off, for any reason, do not turn it on again yourself—call for a trained man.

(*A.G.A. Monthly.*)

Gas Serves the South Bank Exhibition of the FESTIVAL OF BRITAIN

WHAT does it look like, this exhibition on the South Bank? Londoners have watched the intensive work carried out on the site with mingled amusement, wonder, and perplexity. The barriers erected to foil the inquisitive merely fed their curiosity. In eight days from the publication of these words their Majesties the King and Queen will set this complex mechanism in motion. And then everyone—everyone who is prepared to pay the price of admission, that is—will know all about it.

We have in mind the fact that the great majority of our readers will be unfamiliar with the concentrated activity going on in this blessed plot beside Waterloo Bridge; unfamiliar, too, with the skylon, the dome, and the other new additions to the silhouette of London's river; and with the way in which our industry is contributing to what we hope will be the success of the exhibition. For these readers, then, this feature has been prepared. It is incomplete—we make no bones about that. It is written and illustrated with the help of material from a number of sources and on the strength of one visit to the site. In writing this appreciation, therefore, we have tried to make allowances for a number of things. The exhibition as we saw it was unfinished; there remained an immense amount of work to be done, and this essential cleaning up will no doubt make a great difference. Also, the weather was unkind. No spectacle of this nature looks its best on a dull day and, after all, the Festival was designed to be seen in summer. And lastly we would emphasise that the South Bank exhibition is a relatively small part of the Festival, although it is certainly intended as the central hub from which will stem the numerous other features. In this article we have attempted to do two things—one is to give some general impressions of the exhibition as we found it, and the other is to describe some of the ways in which gas is used and the immense work achieved by the South Eastern Gas Board.

First then, the impressions. Our first reaction was amazement at the cramped layout of the exhibition. The designers have attempted to squeeze so much into this tiny site that the pavilions jostle each other as though competing for enough room to present their attractions. The effect would not have been so marked were it not for the designers' obvious determination to counter the limitations of a mere 27 acres by providing the maximum variety of architectural styles. Results have shown that this variety has served only to emphasise this sense of crowding and frustration. If one imagines the same buildings but on a site perhaps five times the size—as might have been available in Hyde Park, for example—the effect is very different. Few can deny that, individually, most of the pavilions and other buildings are interesting creations in the modern architectural medium. Jumbled together they spoil each other's chances.

There is, too, a certain garishness about the exhibition when seen *in toto*. This is partly due to a curious aberration on the part of the designers which has revealed itself in a determination not to allow any two exterior wall surfaces to be similar. This variety has been achieved by a variety of decorative *motifs* and, sometimes, by murals. Generosity prompts us to leave the matter there.

For all its limitations, the site has one enormous advantage. It commands a magnificent view of the river, and this vista has wisely been used as much as possible. To many visitors from overseas this stretch of the Thames is synonymous with their idea of Britain, and moreover, the stretch of water visible from the site helps to relieve an excessive feeling of enclosure.

The exhibition has been divided broadly into two sequences, upstream and downstream. The former, starting from Waterloo Gate, the entrance from the Underground Station, includes a service and administration block, a building devoted to Minerals of the Land, the Skylon, a Dutch barn type of building dealing with the country, a section on sea and ships, the Bailey bridge and restaurant, the transport pavilion, section on the People of Britain, and the Land of Britain, and, lastly, the famous Dome of Discovery, which is the largest dome in the world. The downstream sequence includes the Lion and the Unicorn building, the television and telekinema section, two Homes and Gardens pavilions, an administration and canteen block, Waterloo Bridge Gate, various restaurant facilities, the section on Sport, the Shot Tower, and the Seaside.

The gas story—what there is of it—actually starts with Minerals of the Land, although the link between fuel and power chosen for preferential treatment is the making of iron in a blast furnace. At the end of the mock coalmine in this section is a model of a modern coke works. And that seems to be as near to the carbonisation process as they have got. However, gas pops up as the fuel employed in two working exhibits in the Power and Production pavilion. These include a very fine T. & T. Vickers wafer biscuit-making machine to be operated by Peak Frean & Company, and a glass melting furnace, consuming about 500 cu.ft. an hour, by Sismey & Linforth, Ltd.; the latter is to be used for demonstrations of glass blowing.

One of the most unusual applications of gas to be found on the South Bank and one of the few visible to the visitor

is to be found at the ornamental lake. Presumably the designers of this feature felt that it was desirable to introduce some movement into the lighting effects which would blend in with the movement of the fountains and sprays of water. Concealed electric lighting will be the main source of illumination but as this is considered hard and lifeless, the architect, Mr. R. T. Cadbury-Brown, A.R.I.B.A., decided to introduce gas flambeaux into the scheme and to give them the appearance of light source floating on the surface of the lake.

Tests were carried out at Old Kent Road and it was found that by burning gas of the composition supplied by the Metropolitan division, insufficient luminosity was obtained due to the fact that benzole is stripped from the gas. The Chief Physicist, Mr. G. H. Fuidge, therefore advised the introduction of a small quantity of acetylene and it was found that the addition of 5% acetylene gas gave the burning town gas the rich flame colour which was desired.

Ornamental Flambeaux

Twenty-five flambeaux manufactured by William Sugg & Co., Ltd., have been fitted in the lake and these will consume a total of 10,000 cu.ft. of gas per hour when in operation. Arrangements have been made with the British Oxygen Co., Ltd., for the provision of the necessary equipment to supply the acetylene and this comprises 20 high pressure cylinders and the governing apparatus to reduce the pressure to that of the town gas.

So far we have not been able to judge the effect of this innovation. Although we saw the flambeaux in operation, the electric lighting was not working, and in any case, the effect is intended to be seen at night. At the time of our visit some difficulty was being experienced in designing the bowls or shields to be placed under the flambeaux, but this will no doubt be overcome well before opening day.

Before leaving the more novel uses to which gas has been put on the South Bank some mention must be made of the Rock Pavilion, where Festival rock will be prepared in two 40-gal. super boilers. Here, in addition, gas water heaters have been fitted—presumably to wash sticky fingers!

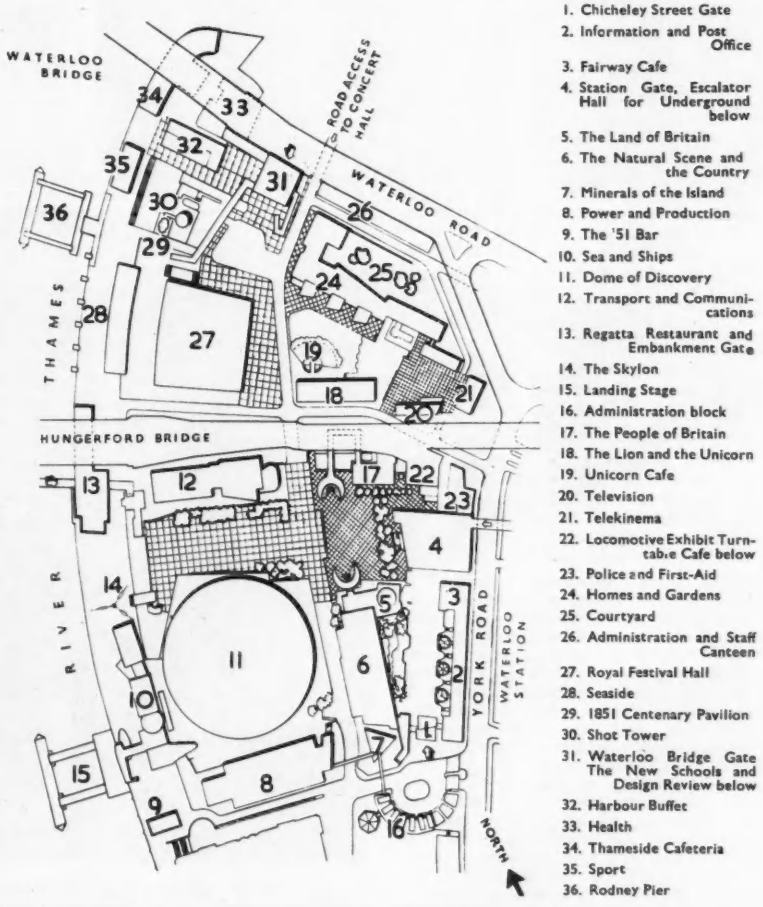
These references to gas supplies remind us that something must be said regarding the South Eastern Gas Board's contribution to the South Bank scheme. The area of 27 acres on which the exhibition is built was scheduled for demolition and clearance under the London County Council General Powers Bill 1939. The area at that time comprised many streets of poor-classed terraced property, while the river frontage was lined with warehouses, coal wharves, and the lead works of Messrs. Walkers Parker, which contained the Shot Tower. Gas was used extensively in these works and the lead melting furnace in the Shot Tower was converted from coal-firing to gas during the early years of the war. The area was badly damaged during the air raids and little residential property remained on it by the end of the war.

With the exception of the gas mains in Belvedere Road (which runs through the site parallel with the river) all the mains in the side roads were cut off when the site was cleared for the exhibition. Close co-operation has been maintained with the architects who have been responsible for the master plan and with the many architects who have been commissioned to design buildings in which restaurants form a part. The result of the co-operation achieved is revealed in this article. The versatility and dependability of gas were never demonstrated better.

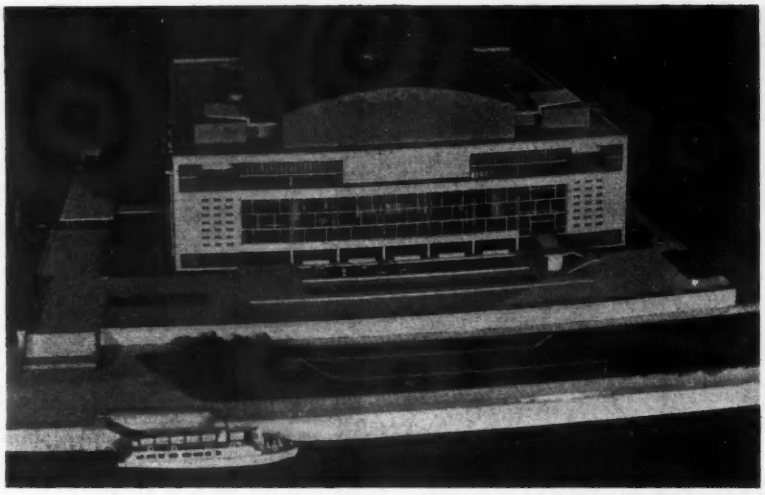
Heat Services in the Concert Hall

Any consideration of the South Bank Exhibition must include, high on the long list of important exhibits, the concert hall. Yet it must be remembered that this is the one item which is not the responsibility of the Festival authorities, but of the London County Council; moreover, it is the one building which will remain as a permanent amenity of London, after the rest have been demolished or, Heaven forbid, in some way adapted as have those at Wembley.

Sited between Hungerford Bridge and Waterloo Bridge, the concert hall has the advantage of the newly created garden frontage which sweeps round from County Hall to Waterloo Bridge. Since the peculiarities of the site rendered impossible the construction of both large and small halls with their attendant services on one level, they have been planned at different levels, with the foyer on a plane with the new gardens between the two. Thus it will be possible to enter the building from either level, the low level approach at Belvedere Road or the high level approach at Hungerford Bridge. At terrace level is an extensive circulation and reception area, central in position and readily accessible from all parts of the building. The two halls and the foyer are, of course, the essential elements of the building, but the overall design must make provision for a considerable amount of ancillary equipment. Much of this is placed around the main auditorium, enabling the whole to be contained in an outer envelope which serves the two-fold purpose of unifying the design and excluding outside noise. In fact, the main auditorium itself becomes an inner core to the building, protected on all sides by its enclosing envelope, and poised above the main reception and circulating area. This arrangement permits the installation of an upper and lower



A plan showing the principal features of the exhibition.



A model showing how the new Royal Festival Hall will look on completion.

restaurant on the river front and within the main foyer space.

In the main auditorium seating accommodation for about 2,900 is provided in two main tiers, and the choir seating for 250 will also be available to the public on occasions. Standing room for approximately 300 is provided in the side galleries, giving total accommodation for 3,450. The platform provides for an orchestra of 100 and a full concert organ, in addition to the facilities for the choir.

The whole of the top floor over the back-stage accommodation is reserved for exhibition space amounting to about 7,200 ft. super, and consisting of a suite of specially lighted rooms intercommunicating and having separate staircase and lift access. Adjacent to this are two meeting rooms which could be used for lectures and other purposes, one seating 200 and the other 100 persons. In addition, two further reception suites, when not in use for other purposes, could be made available for letting.

The two restaurants already mentioned will have accommodation for 700 people, with serveries connected with the kitchens planned on a lower floor. It is so arranged that if the whole area is not required simultaneously, various portions can be used separately. Both foyer and restaurant have direct connection with the new terrace and riverside gardens, and an open-air service of meals could be provided in suitable weather.

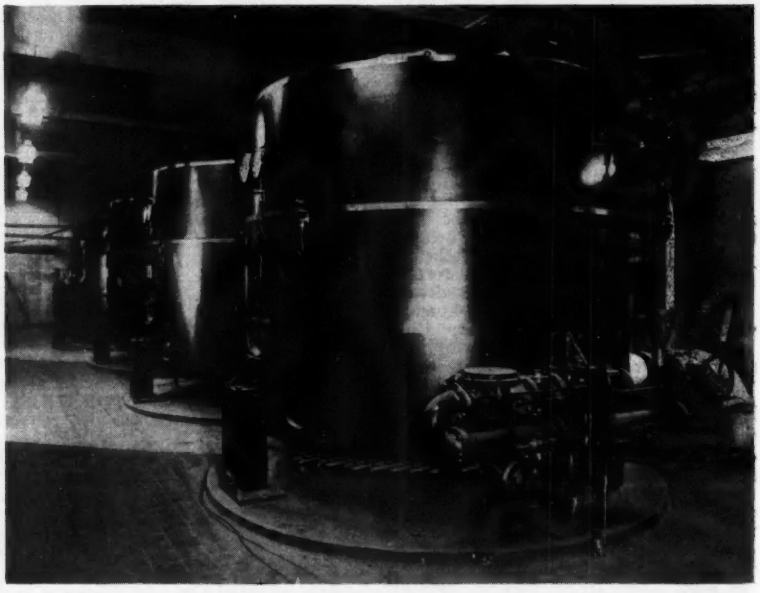
The main contractors, Holland & Hannen and Cubitts, have worked with great speed. In a very short space of time two-thirds of the concert hall has been completed. This first section includes the concert hall proper (with temporary changing rooms for performers), with its approaches, foyers, restuarant, heating, ventilating and electrical equipment, kitchen, a car park and terrace, with the usual minor ancillary services. The temporary changing rooms for performers and accommodation for the administration are located in areas which will in the completed building be allocated to refreshment bars and promenade foyers on the upper floors. It has also necessitated a temporary pavement area next to Belvedere Road on the site of the second section which will be used by the Festival authorities, together with a temporary ramped approach to the main entrance and foyer. One of the most interesting features, and one which is immediately appreciated by anyone who has seen the hall in recent months, is the manner in which the architects have provided a satisfactory architectural treatment of the temporarily unfinished end of the building.

We were fortunate in enjoying a privilege so far denied almost all the other journalists visiting the site. We were able to inspect the whole of the concert hall; and have no hesitation in stating that it is a magnificent building. A description of the main auditorium would be out of place in these columns but it would appear to have everything that London's music-lovers have needed for years. The heating system is no less impressive, and the fact that the hot water and catering services are also by gas makes this a project of which our industry might well be proud.

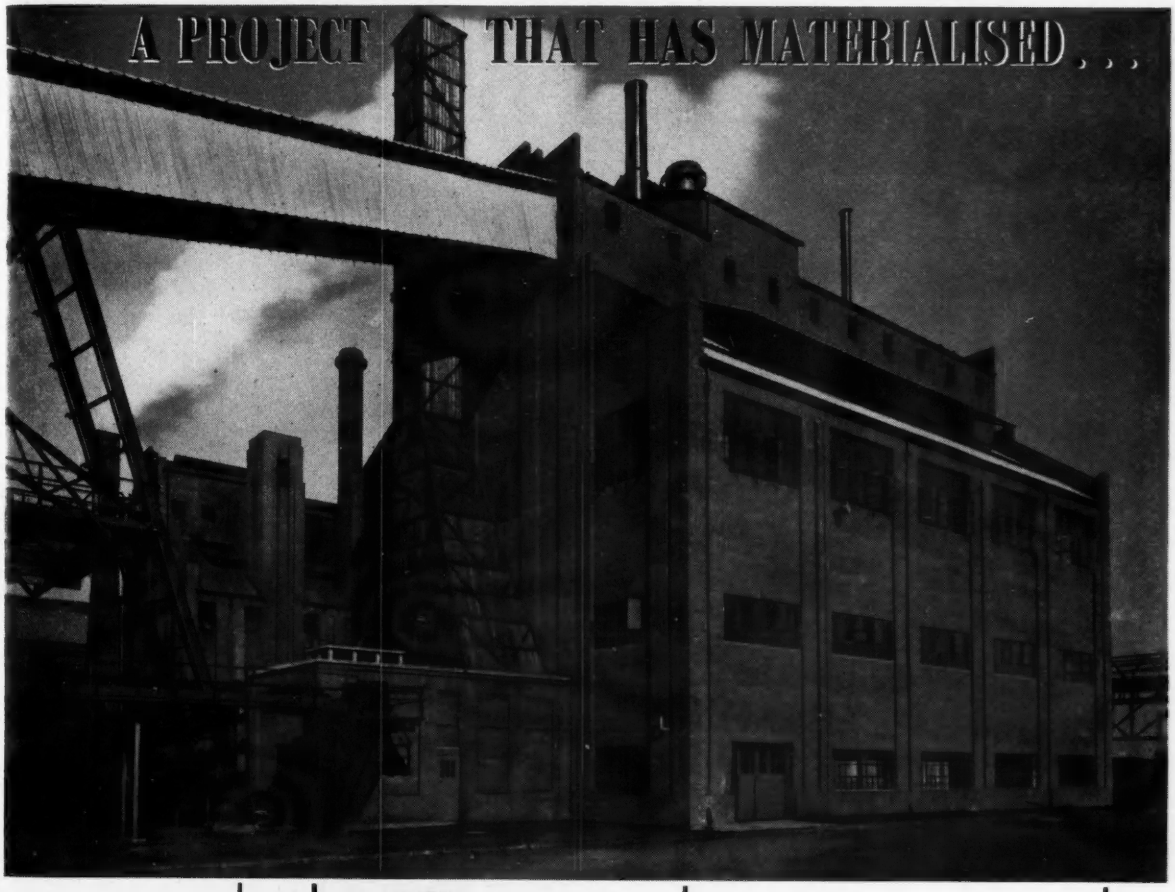
The heating plan for the hall is one of the largest of its kind in the country, representing a total output capacity of 36 mill. B.Th.U. It is anticipated that this plant, using an economiser, will operate at an efficiency of 85%, and this will be coupled with accurate control of the utilisation of the generated heat to ensure maximum economy. The boiler house is in two sections—one for central heating and one for hot water supply.

The heating system comprises five 'Sinuflo' boilers (Cochran & Co., Annan, Ltd.), each with an output of 6,250,000 B.Th.U. per hour, or a total of 31,250,000. The boilers are each 9 ft. in dia. and 9 ft. 6 in. high, and designed for operating on any pressure up to 75 lb. per sq. in. The shells of the boilers are all welded, and below each of the 557 tubes is a gas jet; the latter are mounted on four quadrants, each mounted on special swivels. The comprehensive automatic control installation designed and installed by Thermocontrol Installations, Ltd., includes the following items:

Each of three of the five boilers is fitted with a 6 in. electrically-operated gas valve, arranged to close on current failure and a boiler temperature-limit thermostat to ensure that boiler water temperature does not rise above 190°F. Four thermo-couple-type flame-failure safety switches (one to each boiler quadrant) are interlocked with the main gas valve so that the main gas burners and the pilot burners will be closed down in the event of flame failure on any one quadrant. Four by-pass shut-down gas valves of 1 in. size to shut down on flame failure are fitted, and an interlock with the flue draught controller so arranged that in the event of the flue pull falling below that required for safe operation of



Five 'Cochran' 18D type hot water boilers which supply the heating circuits of the Concert Hall. Each boiler has an output of 6,250,000 B.Th.U. per hour with a gas consumption of 17,400 cu.ft.



. . . WESTON-SUPER-MARE

The New and Fourth Installation of Intermittent Vertical Chambers at the Weston-Super-Mare Station of the South Western Gas Board. The third installation is in the background.

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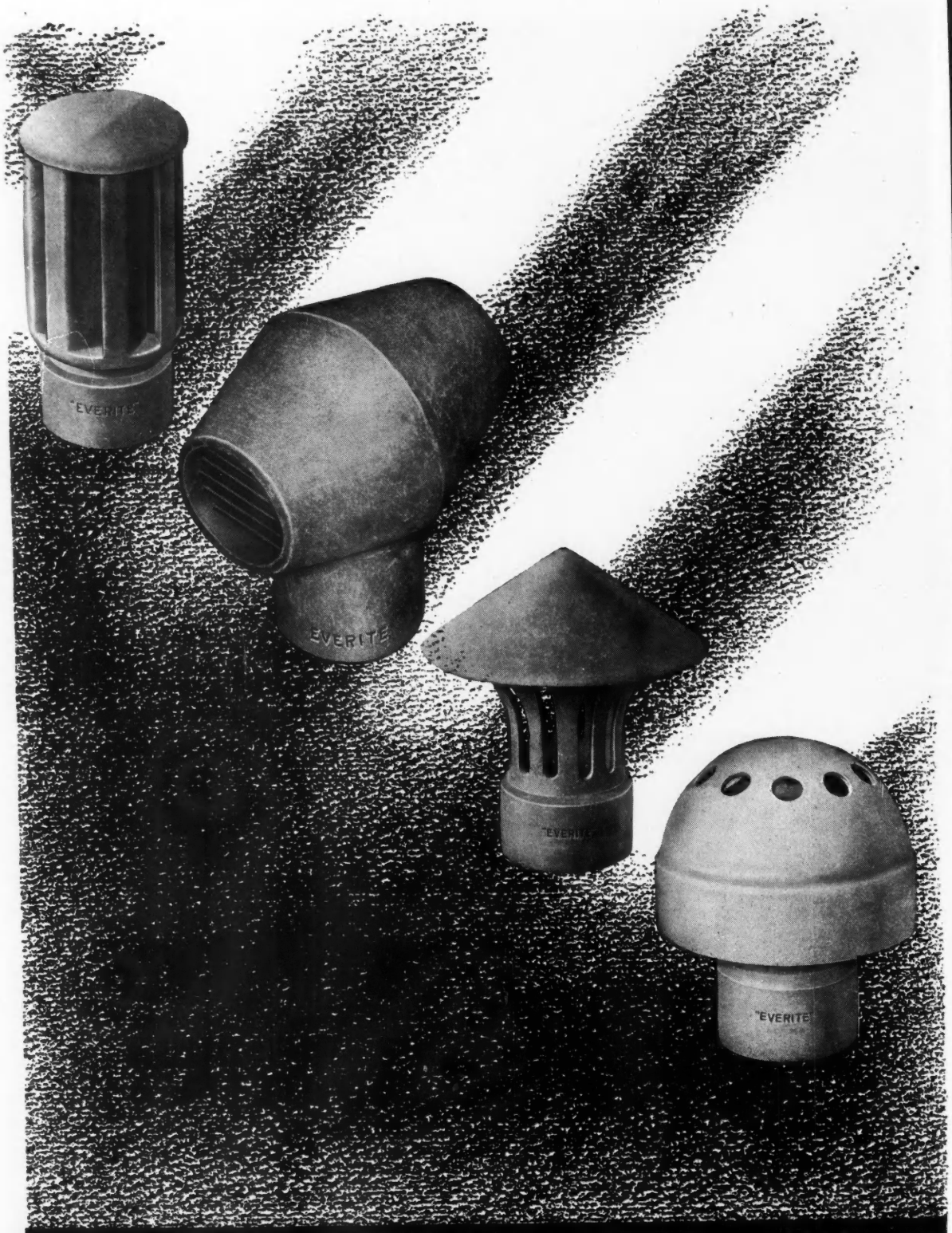

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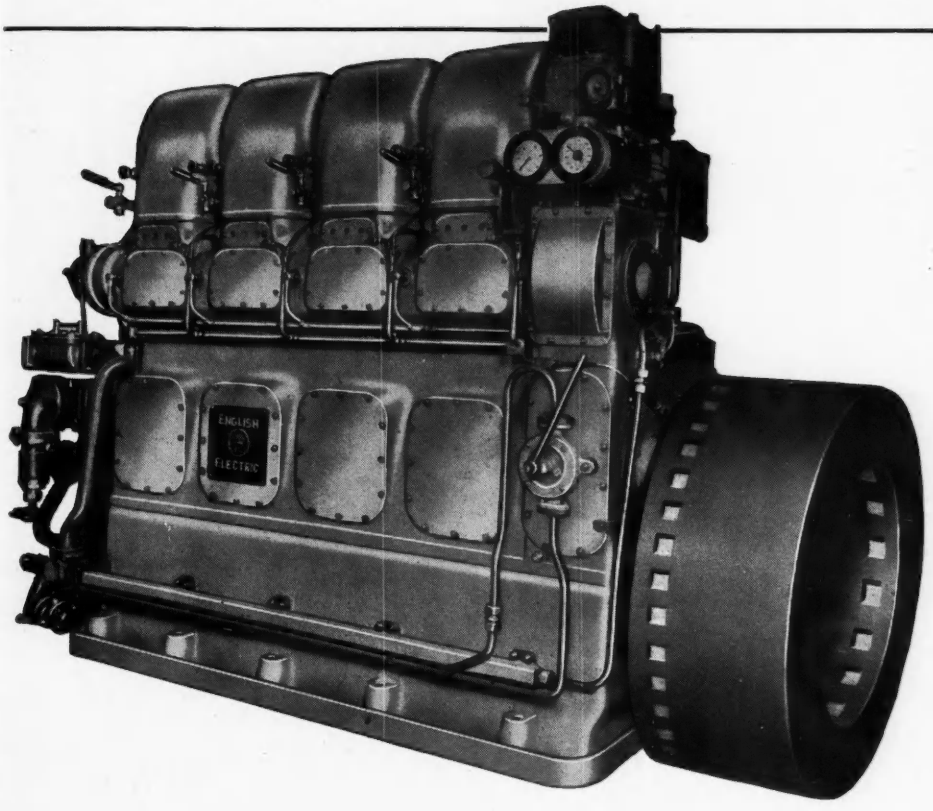

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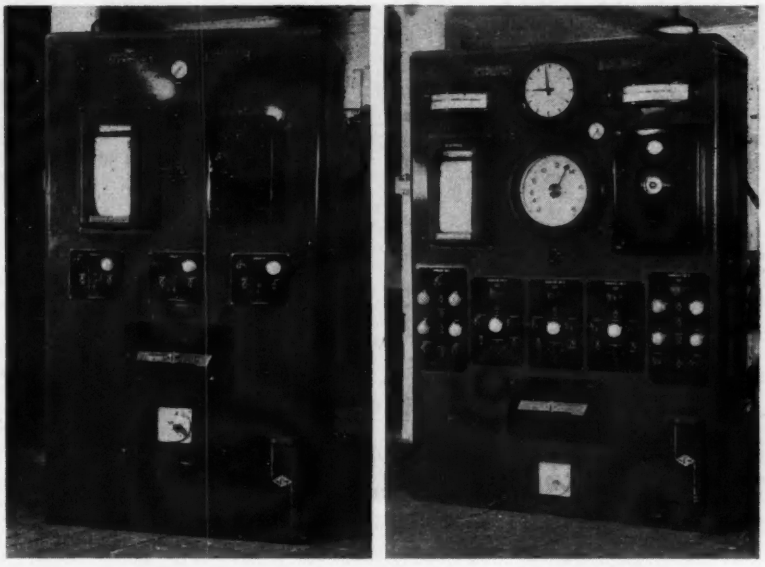
the boilers, such as through induced-draught fan failure, the gas valve will shut.

On each of other two boilers are fitted four 4 in. electrically-operated gas valves, one for each boiler quadrant, arranged to close on current failure, and a boiler temperature-limit thermostat arranged to prevent boiler temperature exceeding 190°F. Four thermo-couple-type flame-failure safety switches are arranged each to close its respective 4 in. quadrant gas valve on current failure and to close pilot valves. In addition, there are four ½ in. pilot gas magnetic valves for closing-off low-flame gas supply to each quadrant on flame failure.

The flue draught controls consist of a flue draught controller placed in the main flue between the last boiler and the economiser which maintains a constant flue suction of 0.03 in W.G., under all conditions of load at the inlet to the economiser, by the operation of a louvred damper in the main flue on the inlet side to the induced-draught fan. This is operated by a pneumatic-hydraulic Delta controller that is capable of exerting a force of some 700 lb. on 8 in. movement.

A similar damper is fitted on the by-pass flue to the economiser and induced-draught fan, and operates when natural draught only is employed. In each of the five boiler uptakes there is a flue damper together with an automatic proportioning motor that is controlled by a draught controller placed in the uptake flue from each boiler on the inlet side to both dampers.

Hot water for the kitchens and cloakrooms is supplied by three Cochran 6D vertical boilers each having an output of 601,000 B.Th.U. These are connected to two large calorifiers and, as in the case of the heating boilers, the plant is fitted with automatic controls. The latter include a main flow temperature controller and a step controller, while night shut-down is by means of a valve on the secondary hot water circulation by a time switch mounted on the control panel. The panel itself, mounting a CO_2 indicator, the draught controllers, pilot lights for each boiler, and the step controller and time switch, ensures sequence boiler lighting.



A close-up of the control panels for the two boiler installations. On the left are the controls for the boilers supplying hot water, and on the right, the controls for the heating circuits. Both panels were supplied by Thermocontrol Installations, Ltd.

The economiser is installed to utilise the fuel gases from the gas-fired boilers to preheat the return to these boilers, thus effecting a fuel saving of 5—6%. It consists of a group of elements, provided with Senior extended heating surface, which incorporates the characteristic straight gas passage. Maximum heat transfer, with easy access for inspection and cleaning, is attained.

The machine is arranged in one group of 42 standard elements having a total heating surface of 1,663 sq. ft., a central baffle being fitted, by means of which, together with the appropriate dampering equipment, the heating surface can be adjusted to suit the varying amounts of flue gas available for preheating the water.

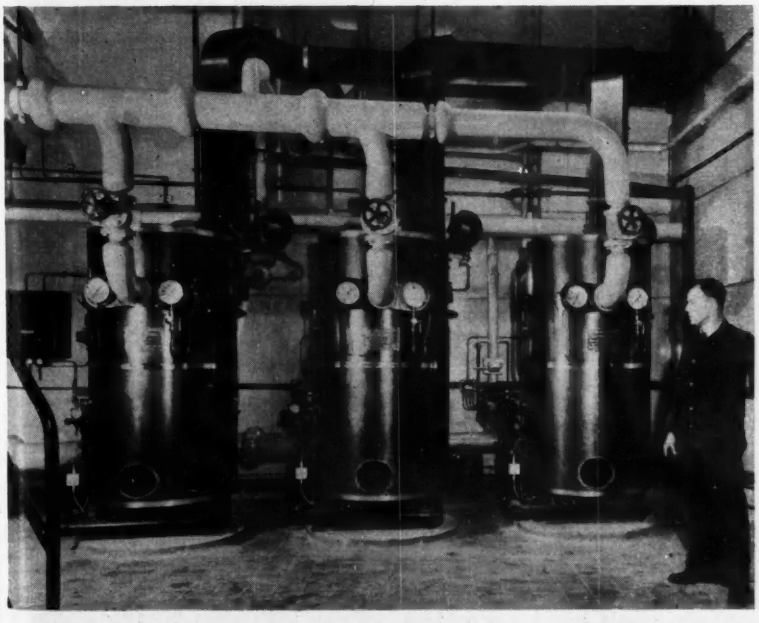
A steel frame houses the economiser, which is enclosed in insulated panelled steel casing, while access doors are provided at suitable points to facilitate inspection of the heating surface and connecting ducts.

A by-pass duct direct to the stack is provided, which enables the economiser and induced-draught fan to be isolated when necessary.

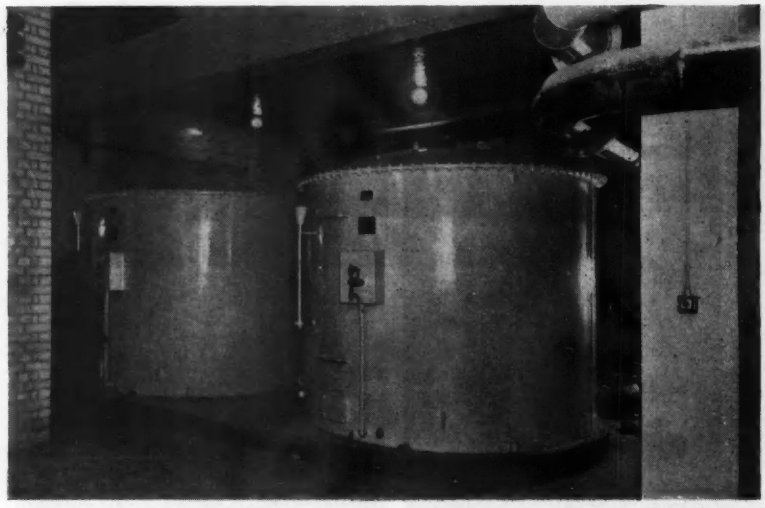
In order to overcome the friction caused by the passage of the flue gases through the economiser, and to compensate the reduction in draught due to the loss in temperature of the gases measured at the stack, brought about by the extraction and utilisation of heat by the economiser, an electrically driven induced-draught fan is incorporated in the plant. Manual and automatic damper control enables the fan suction water gauge to be finely adjusted.

To supply the concert hall with gas, 340 yd. of 15 in. steel service main were laid, and this supplies two No. 90 B.M. meters, each with a capacity of 60,000 cu. ft., and a 6,000 cu. ft. dry meter for the kitchen.

One of the most interesting items in the heating equipment for the concert hall is also a feature of the exhibition. This is the heat pump which is demonstrated as a means of obtaining heat for space heating purposes. The exhibit



The three 'Cochran' 6D vertical boilers each having an output of 601,000 B.Th.U., which supply hot water for the kitchens and cloakrooms at the Concert Hall.



Two No. 90 B.M. oil-sealed gas meters each of 60,000 cu.ft. per hour capacity. These meters supply the heating and hot water boilers of the Concert Hall.

is sponsored by the Ministry of Fuel and Power, and is under the direction of Dr. H. Roxbee Cox, Chief Scientist to the Ministry. It is housed in the railway arches adjacent to the hall, and the heat produced during the time the plant is exhibited will be passed into the heating circuits of the building.

The heat pump consists of a compressor, a condenser and an evaporator, the circuit connecting these components being charged with ammonia vapour and liquid. A prime mover drives the compressor, and this compresses the ammonia vapour from the evaporator, thus raising its temperature and enabling it to give up heat to the water in a water cooled condenser. At the outlet of the condenser the ammonia is expanded through a regulating valve and enters the evaporator at a very low temperature. Here it is vaporised by the heat received from a low temperature source of heat (in this case the river Thames) and passes on to the inlet of the compressor to recommence the cycle again and to give up the heat absorbed. The water heated in the condenser is pumped into the heating circuits of the building. It is claimed that by this method the heat energy obtained from the plant is over three times that consumed by the prime mover.

The Ministry of Fuel and Power are installing as a prime mover two 350 B.H.P. Rolls-Royce 'Merlin' aero engines converted to consume town gas, and the South Eastern Gas Board have laid a 6 in. service main and are fitting a 12,000 cu. ft. per hour meter to supply the gas required. The aim of the sponsors is to supply approximately 30% of the maximum heat required in the concert hall during the winter heating season, and to supply 50% of the cold water that would be required for full air conditioning for the auditorium during hot weather in the summertime. This is the second heat pump operating on a practical scale in this country, and the first to use gas to operate the plant.

The kitchen serving the two restaurants is equipped entirely with gas-heated cooking and dish-washing apparatus. There are also four bars in which gas is used to heat the equipment providing tea and coffee for the audiences. With the exception of two dish-washing machines by the Euk Catering Co., Ltd., and the café sets by W. M. Still & Sons, Ltd., all the catering equipment has been supplied by Benham and Sons, Ltd. Appliances installed include the following; an eight-unit central 'Solid-top' range, with pot rack over, and two chromium-plated water swing arms and control cocks; a gas-heated bain marie; a double gas stockpot stove; four gas-heated pressure type steamers; a 20-gal. boiling pan with a chromium-plated cold water swing arm; three 30-gal. boiling pans with wire baskets, each with a chromium-plated cold water swing arm; a double deck general purpose oven; a roasting oven; a double compartment 24 in. griller and toaster; a single compartment 24 in. gas griller and toaster; a three-pan fish fryer; three hot closets of various sizes; two double deck pastry ovens; a boiling table; two hot closets with bain marie and containers; a 120-pint chromium plated water boiler; and a cabinet hot closet.

Other Catering Facilities

So much for the concert hall. Reference to the kitchen serves as a reminder that, apart from the restaurants in the concert hall (only one is completed), there are on the South Bank ten other sources of refreshment, not counting a staff canteen.

The Garden Buffet is a small buffet on the first floor of the Homes and Gardens Pavilion, having accommodation for about a hundred people. It is designed to supply light refreshments only. The catering appliances installed are a 300-pint tea boiler, a single oven cooker, and Ewart 210 and M.75 water heaters.

The Fairway Café adjoins York Road and Waterloo Station, and accommodates over 200 people. Good class light meals and refreshments will be served, and the service will be by waitresses. The kitchen includes the following: A double oven range, a steamer, a four-tier pastry oven, a 3-ft. griller, a stock pot stand, a Dawson 'A' dish-washing machine, a two-pan fish fryer, 30-gal. boiling pans, an 18-ft. hot cupboard, including bain marie carving tables, an auto-heater (water boiler), and 400-pint tea boilers. Except for the dish-washing machine, all these appliances are by James Stott & Co., Ltd.

The Skylark Buffet is a self-help buffet service for light refreshments, situated on the approach deck of the upstream pier. Seating accommodation is about 200, and the catering appliances include a simple oven cooker, a 300-pint tea boiler, an Ascot 32/6 water heater, a 10-gal. dual purpose boiler, and a Snack Master.

Also offering self-help service of light refreshments is the Whistle Buffet on the first floor of the Industry and Commerce Building. This is unlicensed, and accommodates 150. Appliances installed are approximately the same as for the Skylark Buffet.

The same model appliances are provided for the Unicorn Café adjoining the Lion and Unicorn Pavilion near the Royal Festival Hall. This café comprises a canvas marquee surrounded by imbrellas, and is in an open part of the grounds. It will accommodate about 250 people, and will serve light meals and refreshments.

The Turntable Café and Bar is sited under the new Waterloo Underground station, and is divided into two parts, licensed and unlicensed, for the sale of snack meals. Gas catering appliances include a single oven cooker, Ascot 32/6 and 503 water heaters, a dish-washing machine, and a 400-pint tea boiler.

Thameside Cafeteria

The Thameside Cafeteria, under Waterloo Bridge and facing the river, has accommodation for 600-800 people. It will provide cafeteria service meals at popular prices, and licensed drinks will be available with the meals. The excellent kitchen has two double-oven ranges, a roasting oven, three 30-gal. boiling pans, a 6-ft. steaming oven, two 3-ft. grills, a 3A dish-washing machine and 'Auto Heater' water boiler, Ewart M.210 and M.75 water heaters, a single oven range, a three-deck pastry oven, three 'Rotopan' steamers, a three-pan fish fryer ,a 36-in. hot cupboard, including bain marie and carving table, and two 400-pint tea boilers. With the exception of the water heaters, these appliances are by Crypto, Ltd.

The Harbour Buffet is adjacent to the Thameside Cafeteria and adjoins the Open Air and Sports Arena. With accommodation for approximately 300, it will provide light meals and snacks. Appliances include a Dawson dish-washing machine, a 400-pint tea boiler, a single oven cooker, and two Ascot 32/6 water heaters.

Adjoining the Bailey Bridge and accommodating more than 500 diners on two floors, is the Regatta Restaurant. This has a cocktail bar, beer garden on the ground floor, and will provide service by waitresses of luncheons, teas, dinners and suppers. Here the kitchen is equipped with the following: A double roasting oven, a suite of six ovens with

solid tops, a 50-gal. boiling pan, a 30-gal. boiling pan, two 30-in. grills, ten Ewart 210 water heaters, four Ewart M.75 water heaters, 59 ft. of hot cupboard, including bain marie and carving tables, a 3-tier pastry oven, a 2-pan fish fryer, a 50-gal. dual purpose boiling pan, five Rotopan steamers, a 300-pint tea boiler, a 400-pint tea boiler, and a dish-washing machine. Again, with the exception of the water heaters, this kitchen is by Crypto, Ltd.

Situated on the first floor of the new Waterloo Station is the Rocket Buffet, which is equipped with a 400-pint tea boiler and two 32/6 Ascot water heaters.

The canteen, which will cater for exhibition staff, occupies the two floors of the administrative block. The second floor contains a cafeteria service of main meals and light luncheons, and the first floor contains the kitchen and senior staff dining rooms. It is intended to serve approximately 9,000 meals a day. The gas equipment installed is as follows: Two 'Major' café sets, one 'Junior' café set, two 4-ft. compartment steaming ovens, two 20-gal. boiling pans, four 6-ft. roasting ovens, two 3-pan fish fryers, four 5-gal. 'Multipot,' two large size water boilers, one dish washing machine, three 6-ft. boiling tables, two 6-ft. bain maries, two 40-gal boiling pans, two 24-in. toasters and grillers, two 10 ft. x 2 ft. 6 in. hot cupboards, two 6-gal. milk urns, and two cafeteria sets.

The Downstream Sequence

The downstream sequence goes under the general title of 'The People.' The Lion and the Unicorn Pavilion indicates facets of British character and the Festival Exhibition of Architecture at Poplar deals with planning our towns and houses as a whole. The visitor to the Homes and Gardens Pavilion follows the British people right into their homes, which are shown sometimes as furnished rooms, more often as parts of rooms in which the display is focussed upon various special features. From a broad terrace the pavilion is seen in a setting of three sunken gardens and a blue-tiled ornamental pond whose waters reflect a statue by Jacob Epstein.

At the entrance the visitor is confronted with the underlying problem of the modern home—the problem of space. Displays make the point that 50,000,000 of us live on 93,000 square miles (smaller than New Zealand with 2,000,000 people); and we are told that the square yard of earth exposed at our feet is worth £40. Two great murals emphasise that every home demands space for a great number of activities—cooking, washing, homework, etc.,—and space for a variety of household goods. Evidence of this is provided by the Pantechnicon which, housed in a hall leading off from the entrance, shows what a profusion of articles must be accommodated.

Entering the main pavilion, the first problem is presented—that of the Child in the Home. And here, in the section devoted to the nursery the designers have chosen a 'Vek' convector heater (Sidney Flavel & Co., Ltd.) for warming the room; a flexible plug and socket connector (Nico Light Engineering Company) is also shown.

The second problem is that of the Bed-sitting Room, and the examples shown include suitable rooms for two schoolboys, the young girl, and the bachelor. A 'Lutello' gas fire is incorporated, and among the practical suggestions offered is the shower unit manufactured by Hotsprings, Ltd., shown here with an Ascot water heater.

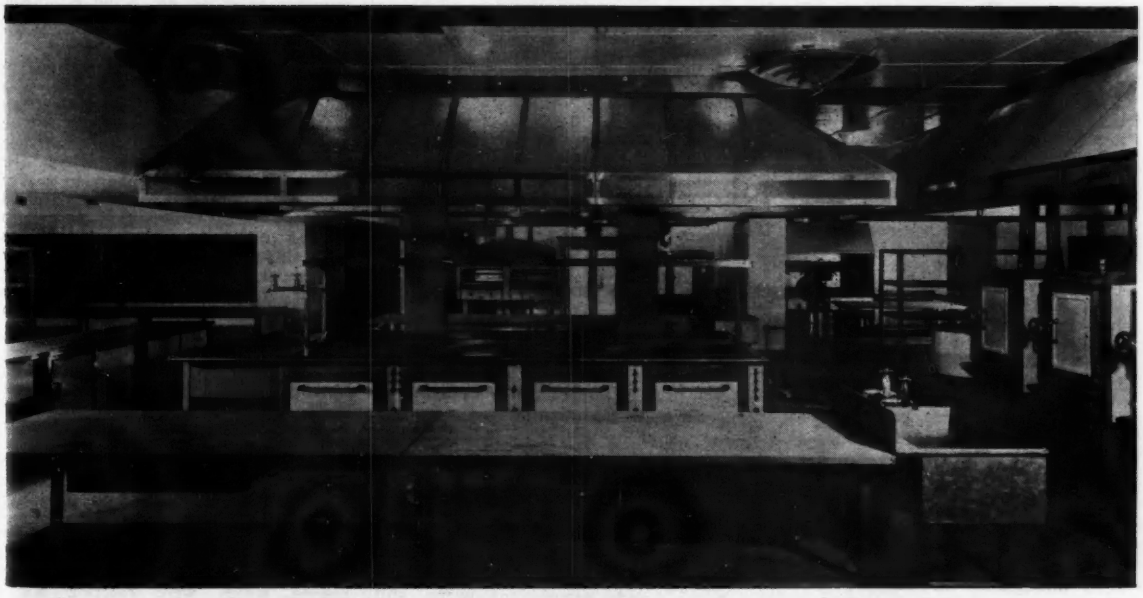
From the Bed-sitting Room to the Kitchen, and here the gas interest is abundant. Developing the theme of the multi-purpose room as a space-saver and social need, the designers in this section have devised variations of the open-planned kichen-dining room. After establishing, by means of an introductory panel, that there is nothing basically new in this idea, the record is brought up to date by a full scale completely equipped kitchen, 28 ft. by 10 ft. 6 in., tilted at an angle of 60°. Here the designers demonstrate that to achieve efficiency, spaciousness and convenience in the small house, small rooms divided by space-wasting walls and passages can be dispensed with in favour of a living area sub-divided into zones for relaxation, eating, cooking and cleaning (serving the function of a scullery). In this open plan, traffic is reduced to a minimum, meals can be taken out of sight of dirty dishes, and children watched.

Abundant Gas Equipment

Subsequent sections show a country kitchen *cum* living room, package kitchen units, and a very considerable display of appliances. Gas equipment included in this kitchen section includes cookers by R. & A. Main, Ltd., General Gas Appliances, Ltd., Sidney Flavel & Co., Ltd., Radiation Ltd., and Cannon Iron Foundries, Ltd. Also shown are a table-top cooker by Radiation Ltd., a double boiling ring by Ascot Gas Water Heaters, Ltd., a built-in refrigerator by Electrolux, Ltd., a sink geyser by Ewart & Son, Ltd., a multipoint water heater by Thomas De La Rue & Co., Ltd., a Thermain No. 2 sink storage water heater by Main Water Heaters, Ltd., a balanced flue instantaneous multipoint water heater by Ascot Gas Water Heaters, Ltd., and an instantaneous sink water heater by Parkinson Water Heaters, Ltd.

The next section deals with Hobbies, from chair-making to rabbits, but the only gas interest is the inclusion of a gas poker by William Edgar & Son, Ltd. Fifth is Entertainment at Home and

(*Concluded on p.* 238)



This fine Concert Hall kitchen was equipped by Benham & Sons, Ltd.

Gas Staffs Seek 20 per cent. Salary Rise

Annual Conference of the B.G.S.A.

JUST under 17,000 members were represented at the annual conference of the British Gas Staff Association which was held at Church House, Westminster, on April 13 and 14, under the Chairmanship of Mr. W. E. Webb, J.P. An agenda of nearly 80 items occupied two whole days. At the outset, Mr. F. C. Henfrey-Smith, General Secretary, reported that a ballot had resulted in the rejection of a proposal to apply for affiliation to the Trades Union Congress, and that under the rules the matter could not be raised again until 1953.

The Chairman, in welcoming the delegates on behalf of the National Council, said it was nice to see so many old stalwarts of the Association who had been in the movement from the beginning, and it was no less a pleasure to welcome a number of delegates who were attending for the first time. This was as it should be. No organisation could hope to survive unless it had a constant influx of new blood and new ideas. He greeted them well and trusted that the forthcoming year would bring some compensation for the labours they had put in on behalf of the Association and the gas industry in general.

A Year of Restraint

The past year had been a period of collaboration, goodwill, and restraint. The annual report contained a full and faithful record of the items and negotiations which had proceeded up to the time of writing the report, and there would be opportunity during the conference to discuss those matters, but there were two matters he ought to mention because conclusion had been reached on them since the report was prepared. He referred first to the marginal grades, a matter which had been a thorn in their side ever since the formation of the Association. He felt that at last a reasonable settlement had been reached. Although he said the settlement was reasonable he realised that much depended on the local interpretation of the settlement by the area boards. It was essential that any marginal grade member who was not satisfied with the position in which he was placed should make full use of the available machinery. It was only in that way that satisfaction could be obtained, and the number of appeals would form a quick method of calculating the amount of satisfaction or discontent which the area boards' interpretation of the agreement gave to the individual and to the Association's members in general. He appealed to delegates to urge members if they were not satisfied not to complain but to lodge their appeals through the recognised machinery.

Co-Partnership

The other matter was co-partnership. Compensation in lieu had been a burning question, and at one time it was feared that inevitably compensation would fall under the compensation regulations. There had been widespread concern throughout the industry because if the matter had been dealt with under the compensation regulations it would have been utterly unjust. The view expressed by the Gas Council was that it should fall under the compensation regulations. The staff side and the Joint Industrial Council took the matter up and unanimous agreement was reached on the staff side and with the manual workers on what should be done. It meant a certain sacrifice because as members of the Association knew, they pinned their faith to a bonus scheme in lieu. It became obvious that they could not make a case where there was much difference of opinion, and therefore the Association, by sacrificing for the time being its bonus proposals, closed the gap and were consequently able to present a united case.

They had reason to be grateful to the Minister for the broad-minded and friendly way he received their suggestions, with the result that the matter was left to the Gas Council and the trade unions to settle between them by arrangement. Although they did not claim that the settlement satisfied everybody they did feel that in the circumstances it was a very fair compromise indeed and one which had given general satisfaction throughout the industry.

Negotiating Machinery

Negotiationg machinery had been completed and it now merely remained to set up local committees. It would be their business to see that the people appointed to the local committees were members of the B.G.S.A. It would be necessary that there should be appointed in each office or depot one member who would be able to take up matters with the management which were outside the scope of the local staff committee. Unless full use was made of the machinery that had been set up things might be difficult for many of them, and he would urge on them all—and he mentioned this particularly in view of what had happened in regard to overtime—that whatever agreement they reached at national level should be interpreted to the letter locally; any difficulties that they encountered should be referred back to headquarters so that they could be settled at national level.

Speaking of negotiating machinery, they had recently been in negotiation with the Gas Council on the question of a claim for a 20% increase in salaries and salary scales for all gas staffs in the country. The Gas Council had made an offer which they felt was not good enough, and negotiations were still going on. They hoped that in the not too distant future they might have compensation in the form of an increase in salary which would enable them to offset the cost of living increases which had caused so much concern to them all.

The B.G.S.A. was not yet represented on the senior grade staff council which had been set up. At last year's conference they were given certain facts, and he (Mr. Webb) was given a vote of confidence which moved him tremendously. As he had already indicated, they had exercised considerable restraint during the past year, and this was one of the matters he had in mind. He had recently made a personal appeal to the Gas Council for the inclusion of the Association in the new machinery on two grounds, (1) that they had had senior grade members for a very long time, ever since their inception, and (2) that it was inevitable that with the passage of time many younger members would pass into senior grades and would not wish to leave the organisation in which they commenced their life in the gas industry. He had had a reply from Colonel H. C. Smith who had promised that the points raised would be given consideration. He hoped the Gas Council would see reason in this matter and give them the representation they desired.

Friendly Relations

'Our relations with the Gas Council have been on a very friendly footing,' continued Mr. Webb, 'and during the year no sort of friction has arisen between us. That is true also of the area boards where better and more harmonious relations are being established and some of the friction in the early days has been largely removed.'

In accordance with the wishes expressed at last year's conference they had entered into an agreement with Nalgo, and their differences had been satisfactorily settled. There had been some friction in the Birmingham area, and he appealed to members in general, and especially those in that area, to remember that when the Association entered into any agreement with any body or individual it would honour that agreement to the letter until such time as they had occasion to give formal notice to withdraw from such an agreement.

Policy Unchanged

The policy of the Association continued unchanged. The National Council held that the ideal for the gas industry, and indeed for all industries, was a system of industrial trade unionism, which, so far as they were concerned, simply meant gas staffs in gas organisations, which in turn meant membership of the B.G.S.A. They did not think that in these times the large unions which were catering for a diversity of trades and interests could

possibly hope really and truly to represent all the various sections which they had established within their unions. They had seen frequent evidence in the disputes which had occurred during the last few years that the large unions were troubled because they were out of touch with their members.

Membership Drive

He urged all gas staffs—and there were many who were still outside any organisation—to join the B.G.S.A., because, whether they liked it or not, it was a fact that, the negotiating machinery having been established, there was no other way of airing or settling their grievances than by that machinery. In that machinery they had established something which, if not spectacular, was founded on a firm and solid basis on which they could build for the future. The policy of the Association had always been to keep clear of politics, and that was one of the reasons why no member of any gas staff should have any reluctance to join.

He hoped that there would be an all out drive for increased membership during the year. The national organiser and his staff were up against tremendous broblems, and he appealed to everyone to help in making the year a record one for membership.

Referring to the structure of the gas industry, Mr. Webb recalled that when the Gas Act was passed it was stated in the Commons that the nationalised structure of the gas industry was something in the nature of an experiment. It was true to say that it was the only nationalised industry with autonomous area boards. It was safe to assume that if this experiment in nationalisation proved successful it would provide a cue and a line for possible adaptation to other industries. It was a moot point with many people whether a great contralised control was better than the system we had. They were quite aware that it was not 100% perfect at the moment in the gas industry because certain area boards had their own points of view and felt that certain things were best done in their own way, and the Act gave them that privilege. 'It is up to us to prove by loyal co-operation,' said Mr. Webb, 'that this system is the best. and our National Council feels that it is the best form of organisation; ultimately we hope that this nationalised gas industry will prove to be a model for the nation.'

The National Council throughout the year had worked well and loyally together. Members were well and truly represented and he thought they were satisfied, from the outcome of negotiations both at national and local level. that they had in the National Council a very admirable body of representatives. He paid tribute to the work of the Vice-Chairman, the General Secretary, the National Organiser, the Treasurer, and the staff at Knightsbridge for their local service to the Association.

The Annual Report

The annual report recorded that during 1950 there was established a National Joint Council, which negotiated a national salary scale, holiday agreement, and sick pay scheme and stabilised the hours of work. Twelve area Joint Councils for Gas Staffs have been established and have had regular meetings to implement the national agreements. In all but three areas, the agreed salary scales are in operation.

For intermediate grades, a national committee and twelve area committees have been set up. A scheme of salaries and conditions has been negotiated and now is in process of implementation.

It remains to agree and establish local staff committees whereby the staff can discuss with the local management all matters of mutual interest, including the efficiency of the service, and the complete machinery for consultation with the staff will be in operation.

While it welcomes the introduction of a national salary scheme for the staff of the whole industry, the National Council 'is aware that the present level is inadequate and unlikely either to retain trained personnel in the industry or to encourage recruitment.'

950 New Members

Starting the year with 15,950 members, the net increase in membership was 950, the total at December 31 being 16,900. The number of branches increased by one to 166.

The 12 area councils of the Association met regularly during the year to co-ordinate the work of the branches and to supervise them. These councils form the link between the branches and the national council and forward to the national council the views and opinions of the branches in their areas and are frequently consulted on matters of policy.

After detailing the formation and duties of the National Joint Council for Gas Staffs covering administrative, professional, technical and clerical staffs who are normally graded and up to a salary limit at present fixed at £800 per annum in the Metropolitan Area and £770 in the provinces, the report recalled that the intention to set up separate negotiating machinery for senior staff officers was reported last year. The B.G.S.A. was a party to all preliminary discussions on this matter and the three organisations invited by the Gas Council to these discussions had agreed that they would form the staff side of the proposed council. The Gas Council has the right, under Section 57 of the Gas Act, to decide which organisations are appropriate for negotiation of terms and conditions of employment and it decided to exclude the Association. The B.G.S.A. claimed 155 members (15%) in the class concerned out of a total claimed membership of 1,053. The Gas Council had previously accepted unions with a much smaller percentage on to the National Joint Council for Gas Staffs.

The Gas Council, requested by the Association to explain its exclusion, stated that it had collected further information about the staffs that would come under the jurisdiction of such a third national negotiating body (including the membership of such staffs in each of the Unions concerned) and after careful study of this information, the Gas Council had approached the two other organisations as appropriate for consultation respecting the establishment of such machinery.

'No Legal Redress'

The Association referred the matter to the Ministry of Labour and National Service and to the Ministry of Fuel and Power. Officials of both Ministries interviewed representatives of the B.G.S.A. and also heard the views of the Gas Council but took no further action. Counsel's opinion was then obtained but it would appear that the Association has no legal redress.

The National Council continued to build up good relations with the other organisations on the National Joint Council for Gas Staffs. Agreement was reached with Nalgo under which both bodies accept the position that each has a substantial membership among gas staffs and agrees to co-operate in the interests of those staffs. Propaganda is not to be issued by either trade union that makes derogatory reference to the other, but neither is debarred from expressing opinions as to the best form of trade unionism for gas staffs, provided that such opinions are not addressed directly to the members of the other trade union.

Where the majority of non-manual employees in a gas undertaking are members of one of the two unions, the other union, if it has not already members among non-manual employees in that undertaking, will not commence organising activities unless by agreement with the other union of which such employees are already members. Neither union will accept into membership a member of the other union without enquiry and agreement; provided that agreement shall not be unreasonably withheld. The union concerned will be under an obligation to reply to an inquiry within 14 days.

Conference Resolutions

The conference endorsed a series of resolutions submitted by the National Council advocating a national fuel policy; the retention of National Arbitration Order No. 1305 enforcing compulsory arbitration in trade disputes; that employees be taken fully into the confidence of the boards regarding the planning of the industry; the adoption of a policy of full employment within the industry; equal pay for equal work; and welcoming the introduction of a national education scheme to assist all employees to qualify to increase their efficiency and recommending all younger employees to accept the facilities made available by the boards.

Another resolution passed on the recommendation of the National Council urged the Government to amend Section 57 of the Gas Act which gives arbitrary powers to the Gas Council and area boards to decide which organisations are appropriate to conduct negotiations on behalf of any section of the employees; the resolution added: 'Recognition is

(*Concluded on p. 238*)

CONSULTATIVE COUNCILS IN SESSION

South Eastern Faces £1½ Mill. Rise in Costs

WARNING of probable further increases in gas prices to meet additional costs amounting to more than £1½ mill. per annum was given to the South Eastern Gas Consultative Council at its quarterly meeting at Croydon on April 3 by Mr. R. S. Johnson, Deputy Chairman of the South Eastern Gas Board. He recalled that in July last year Mr. W. K. Hutchison, Chairman of the Board, addressed the Council on the subject of increased charges which the Board then had to face and which were shown to total some £880,000 per annum. Consequent on those increases the Chairman advised the Council that some advances in the price of gas would be required, and these, calculated to produce £650,000 per annum, were put into operation in the autumn. The Board succeeded in meeting the balance of the increased costs out of revenue.

It would be common knowledge, said Mr. Johnson, that since that date there had been a marked acceleration in the upward course of prices of nearly everything which they bought, and the Board was now confronted with further additions to its costs of something over £1½ mill. per annum after taking credit for increased revenue from by-products, viz.:—

Increased Costs—

	£
Coal (including steamer freight rates) ...	892,000
Gas Oil	103,000
Materials	295,000
Wages	464,000
Depreciation and Interest on Capital Expenditure...	250,000
	£2,004,000

Increased Revenue—

	£	£
Coke and Breeze	301,000	
Tar and Benzole	122,000	
		423,000
Annual additional cost ...		£1,581,000

The two heaviest increases related to coal and wages. Pit-head price of coal had risen by 4s. 2d. per ton and freight rates on coal by an average of more than 9d. per ton. Wages had by national award lately advanced by between 1½d. and 2½d. an hour.

In addition to the ascertained increases further increases in outlay were to be expected as a result of the continuing rise in the cost of materials, and freight, larger charges for depreciation and interest on capital expenditure, and augmented contributions to pension funds. These items were the subject of movement over which the Board had little or no control, but everything possible was being done to reduce their effect on the gas consumer to an absolute minimum.

Economies in manufacture and in other directions had been and were being made, and with an increase in sales of gas and appliances, it was hoped that a substantial part of the additional costs would be absorbed. It was clear, however, that part of them would have to be recovered by increasing the price of gas and the Board was giving the whole matter close attention at the present time. The Council would be consulted before any action was taken.

The meeting was presided over by Mrs. D. N. Rathbone, Deputy Chairman, and, in addition to Mr. Johnson, the meeting was attended by Mr. R. H. Sandford-Smith (Secretary) and Mr. C. Stredwick (Chief Accountant).

Mr. Johnson spoke of the main features of the recently published report and statement of accounts for the period ending March 31, 1950. The Council formally approved the published report and expressed satisfaction at the comprehensive and informative manner in which it had been presented.

The Council also received a statement, by the Board's Commercial Manager, on the position of local authorities' tenants, in the matter of freedom of choice between gas and electricity.

A number of items of correspondence relating to consumers' complaints were dealt with and mainly settled to their satisfaction. One consumer felt there should be a standardization of tariff rates throughout the country. In view of the definition of the Council's functions, as contained in the Gas Act, however, the Council was unable to support such application.

Nominations had been solicited from local authorities and other bodies within the area for membership of the six district committees, whose annual term of office was due for renewal on June 1. District committee reports included steps taken through the local Press of the Kent County District to contradict a prevailing rumour that members of district committees were paid for their services.

Concern was expressed at the limited number of cookers available for ordinary hire, but it was agreed that in all the circumstances, the Board was making every effort to cope with the situation.

Members expressed certain difficulties experienced in dealing with approaches made by the public in the matter of supplies and deliveries of coke. It was made clear, however, that such matters did not come within the purview of the Council, but in the absence of any modification of existing regulations, it was decided to continue passing on such enquiries, as a matter of courtesy, to the appropriate department of the Board.

The shortage of shillings for use in prepayment meters was discussed as a prevailing difficulty in many localities. Certain recommendations were suggested for dealing with this position, but a proposal that shilling tokens should be introduced did not find general support.

Higher Charges in West Midlands

HIGHER charges for gas were forecast at a meeting of the West Midlands Gas Consultative Council at Wolverhampton on April 9. The chair was occupied by Councillor W. H. Malcolm. A statement was made on the subject by Mr. G. le B. Diamond, who recalled that in January he informed the Council that considerable additional expenses had been imposed on the Board owing to the general rise in price of raw materials. He said then that gas oil had increased by ⅝d. per gal., which would cost £75,000 for a full year. The Board could absorb this amount but could not continue to bear additional costs which were coming at such frequent intervals that the increased efficiency and improved working results obtained by the Board were being cancelled out.

Since that time they had been notified of an increase in the price of coal of 4s. 2d. per ton, which, after deducting the amount received from the additional selling price of coke announced by the Minister, would cost the Board £316,000 per annum. The increased cost of coal also affected coke oven gas contracts and this would involve an increase of £8,000.

Raw materials other than coal and gas oil were continually rising and they were daily expecting an announcement concerning the increase of railway freight charges. It was obvious that new capital for the considerable projects on hand could not be obtained at the previous cheap rates. They had made an estimate of the additional annual costs which might fall from these sources and it might well be from £500,000 to £600,000.

The Consultative Council was aware that a great deal of preparatory work had already been done towards the formation of a gas tariff based on unified principles but not on standard charges and it was intended to place this before the Council during the present year. The magnitude and the complexity of the problems involved in unifying such a diversity of prices and methods of charge was further complicated by constantly rising costs and he would not like to be too sure that they would conclude this work before the end of the year.

The increased costs which he had mentioned could not possibly be met by the existing margin between revenue and expenditure and it would be necessary at an early date to bring before the Council proposals for further price increases. He gave the following summary of additional costs:

	£
Gas Oil	75,000
Coal, less amount received from increase in selling price of coke	316,000
Coke Oven Gas	8,000
National wage and salary awards ...	259,000
Materials other than coal and gas oil ...	500,000
	£1,158,000

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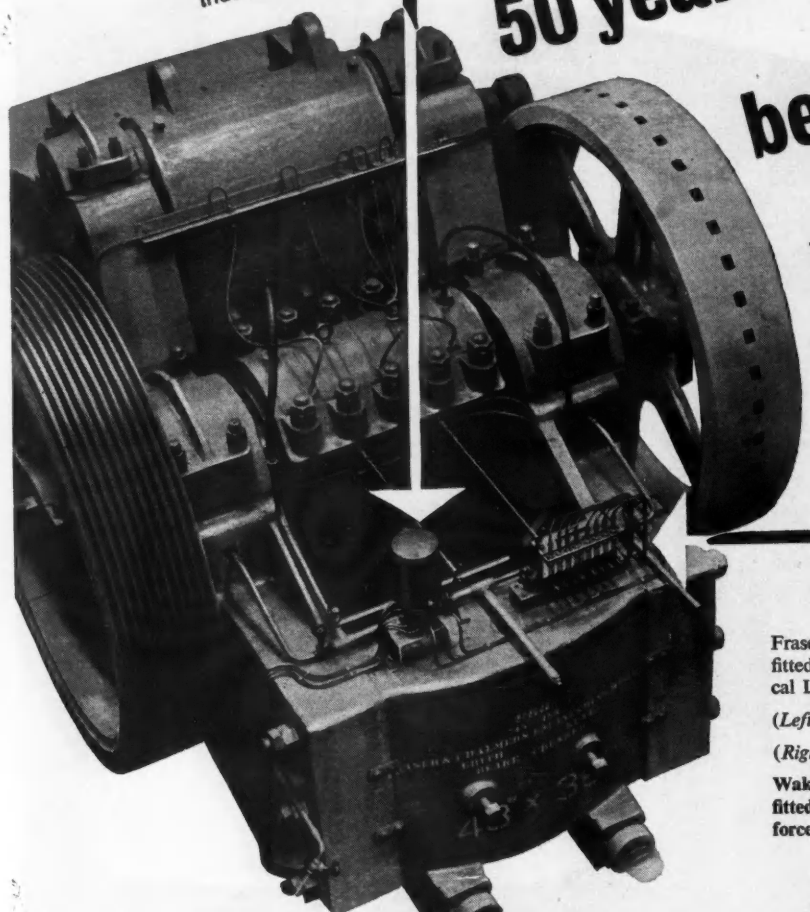
The difference between a good lubricator and a **better** lubricator is the experience that lies behind it

there is over 50 years' experience behind every Wakefield lubricator



Fraser & Chalmers' 48" x 36" Blake Crusher fitted with two types of Wakefield Mechanical Lubricator.

(*Left*): *2G Grease Lubricator.*

(*Right*): *DP Sight Feed Oil Lubricator.*

Wakefield Mechanical Lubricators can be fitted to all types of machinery requiring forced feed lubrication

The reliability and efficiency of the new Wakefield " Improved " 2G Mechanical Grease Lubricator—capable of operating with almost every type of grease in normal industrial use—and the widely specified DP Sight Feed Mechanical Oil Lubricator, is the result of over 50 years of Wakefield research into the problems of industrial lubrication.

We shall be pleased to send you copies of our illustrated booklets on the 2G and DP Lubricators upon request to

WAKEFIELD
MECHANICAL LUBRICATORS

C. C. WAKEFIELD & CO. LTD., LONDON, W.1 *Makers of Lubricating Equipment since* 1899

Mr. Diamond said they would appreciate that even with the magnitude of their business they could not absorb an amount like that. He could not tell them when he would come to the Council to discuss the price of gas, but it must obviously be in the next month or two. He wished, however, to give notice of what was happening and it might be that a special meeting would be necessary.

The Chairman welcomed new members of the Council, viz.: Mr. W. V. Collier (Warwick), Councillor C. Lowe (Wellington), Mrs. K. Newbould (Redditch) and Alderman W. Pigott (Hereford).

Gasholder Decision

Mr. Diamond reported that the Board had just learned that the Ministry of Local Government and Planning had agreed that gasholders could be erected on the James Bridge site at Walsall. The job had been held up a long time waiting for a decision. They all knew how essential it was for planning to be done properly and the amenities of the countryside preserved, but he must say they were finding the present act very onerous to apply with all its requirements and it produced delays which were not experienced previously. The Walsall carbonising plant could not be ready in anything like the time stated. He could not give them any forecast as to when it would be ready because the future was so uncertain. The same difficulties would have arisen if the local authority at Walsall had continued to be the owners. As far as they were concerned it was good news at long last.

Dealing with the next item, the Chairman said the question of the publication of gas consumption figures during peak hours on Sundays had been raised, but they had come to the conclusion that the value of the figures would be disproportionate to the amount of work involved. Anyone who wanted the information could have it as it was kept in the form of a graph which showed the consumption of gas for every day.

Unsubstantiated Complaint

A complaint had been received that gas boilers were responsible for the melting of bitumastic floors in new houses at Hereford. It was felt to be a matter of great concern and the Board looked on it seriously. Engineers were sent down prepared to fit iron plates, but it was found that the Mayor of Hereford knew nothing about it, neither did the Manager. It was then said that the information had come from an individual who was interested in aluminium houses. It was not intended to let the matter drop, but if someone was going round making a general statement which could not be substantiated it would have to be thrashed out.

A member of the Council said composition floors were found mostly in canteens and schools and he thought they were satisfactory.

The Chairman said they had sent a resolution to the Minister of Fuel and Power saying that the cost of gas water heaters, plus purchase tax and fixing charges, was too high and suggesting that if heaters could be provided more cheaply a saving in fuel might result. He had received an acknowledgment and nothing further.

The annual report of the West Midlands Gas Board was presented and Mr. Diamond offered to answer any questions but none was forthcoming and the report was approved on the proposition of Alderman Williams, seconded by Councillor Lowe.

Carlisle Progress

MR. J. G. AITKEN (Carlisle Divisional General Manager) informed the Carlisle Consumer Committee at a meeting on April 9 that a contract had been placed for the reconstruction of part of the gasmaking plant at Carlisle, and it was hoped that this would be complete for the 1952-53 winter.

To meet the increasing load, a new electrostatic detarrer and a set of purifiers were to be installed this year. So far as distribution in Carlisle was concerned, Mr. Aitken said that a considerable length of mains had been laid to meet the demands of new housing estates.

At Brampton 680 yd. of new main had been laid, Mr. Aitken told the committee, and pressures in all districts had improved as a result. There were, however, a number of black spots fed by long lengths of quite inadequate mains, but these were being tackled as materials and labour became available. At Wigton, one new main had been laid which had removed the only serious district complaint. Materials for a high-pressure main were expected after June and compressors in the autumn, but it was rather early to promise a completion date under present-day conditions. All wayleaves had been negotiated with the exception of one small section of railway property.

On the sales side, Mr. Aitken stated that showroom premises had been acquired in Carlisle, and it was hoped that these would be open for the collection of accounts within a fortnight. At Wigton an office at the works had been equipped to display appliances, and good sales had resulted. Similar arrangements were being made at Brampton.

Developments in the Blyth Division

IMPORTANT development schemes which have been started during the past year in the Blyth Division of the Northern Gas Board in order to provide a better service to consumers were outlined by Mr. W. Sutcliffe (Divisional General Manager) to a meeting of the Blyth Consumer Committee recently.

Mr. Sutcliffe said that the demand for gas had increased steadily by approximately 4% over last year, and apart from a short period when the demand at Blyth exceeded the supply no severe pressure cuts were made. He paid tribute to the co-operation of the Blyth Corporation in reducing their public lighting demands over the peak winter period.

Work was proceeding on the erection of the new carbonising plant at Blyth, and this was due for completion in November this year. The new 9-in. main to Newsham was completed and a gas booster was expected to be installed this summer. Already there had been a substantial improvement in gas pressures in the Newsham area, and when the scheme was completed consumers in this area should be well catered for.

Work had started on a 6-in. high-pressure link between Stannington and Bedlington which, when completed, would enable gas from the Newcastle Division to be supplied to Bedlington. At Berwick, a new carbonising plant had been placed on order subject to the approval of the County Planning Officer for Northumberland. This plant was expected to be completed in 1953 and would make the position at Berwick secure for the future.

They were proceeding with their plans to increase the capacity of the Alnwick works and to extend gas supplies to Shilbottle, said Mr. Sutcliffe. This main would be extended to Amble and the Amble works closed. It was encouraging to note that the Alnwick Rural District Council had agreed to provide gas cookers and boilers in their new housing scheme at Warkworth. Supplies, in the first instance, would be from Amble, and when the Alnwick-Amble link-up was completed, from Alnwick. Warkworth would now have a gas supply for the first time since 1918.

Mr. Sutcliffe pointed out that attention had been directed to improving the plants at the smaller units, especially at Amble and Rothbury, and consumers in these areas should have noticed a decided improvement.

Sales of appliances had continued to be satisfactory, and since April 1, 1950, some 800 additional cookers had been fixed in the Division. The introduction of the 'Northern' cooker had proved very popular, especially in Blyth and Berwick, and there was a waiting list for this excellent appliance which was doing so much to replace old black cookers. A home service adviser had been available since February of this year, and it was expected that consumers would benefit from her advice. At present the service was limited but would be extended as experience was gained. The 'on demand' service for consumers' appliances continued and was being improved wherever possible. Their efforts were particularly directed towards the replacement of obsolete appliances by more efficient ones.

'I hope you have concluded that we have not been idle," said Mr. Sutcliffe. 'Several big schemes involving large sums of money have been started, and there are more to come with the object of providing a better service to our consumers.'

New Tariffs in the South West

'WE have to raise a million pounds to meet extra costs,' said Mr. C. H. Chester, Chairman of the South Western Gas Board, in explaining to the Consultative Council at Taunton on April 17 the Board's proposals for new tariffs for gas and the hire of apparatus. Details of proposed increases, which will take effect in June this year, were discussed privately and then formally accepted.

Mr. Chester said they had tried to get a common principle running right through from the domestic consumer to the largest industrialist and the proposed new charges were the result of nearly two years' research. There were nearly 750,000 consumers in the area. They hoped eventually to give the perfect service. They had saved £250,000 in their second year of operations and that would write off roughly half the initial loss. They had not sought to wipe out any of the deficit by increased prices. The savings in the third year would be higher still. They were integrating very rapidly.

The Board treated all their affairs as a completely open book. They sought to hide nothing.

In preparing the new tariffs the Board had only taken into account actual known increases in costs, which amounted to £1,099,500, less £145,000 from the increased price charged for coke, leaving £954,500 net. There were further increases pending both as a result of national negotiations and as a result of the Budget. On a conservative estimate these were likely to amount to £300,000 to £400,000 per annum, bringing the total increase in costs since a year ago up to well over £1¼ mill.

The new tariffs were estimated in a full year to produce £974,000 and, if they became operative on June 1, they would produce £824,000 by March 31, 1952. Deducting this increased revenue from the increased costs meant that the Board would have to save this year by efficiency in working or by increased sales no less than £426,000 (costs £1,250,000 less revenue £824,000) if the third year's operations were not to show a deficiency. In effect, the Board would be meeting a third of the increased costs by improved methods of production and administration.

Mr. Chester said the Board had brought down the number of varying prices from 2,000 to six. They were reviewing all street lighting contracts. They had the same labour force as previously and output had increased.

North Western Appointments

Councillor S. Hanham (Poulton-le-Fylde), Alderman W. Tattersall (Birkdale) and Councillor J. Tildesley, J.P. (Runcorn) have been appointed members of the North Western Gas Consultative Council.

FESTIVAL OF BRITAIN —

(*Concluded from page 229*)

lastly, a section devoted to the Parlour. Commencing with four panels showing the dominant styles which appeared during the last hundred years, the section continues with seven scenes in which the designers have tried to be as catholic as possible, producing labour-saving ideas for those who hate housework; but in other displays they include features to appeal to those who enjoy titivating their homes and are prepared to do the extra work this requires. Here there are two gas appliances—a 'Vek' convector fire (Sidney Flavel & Co., Ltd.), and a 'Symphonie' gas fire (Radiation, Ltd.).

As is generally known, one of the more novel features of the Festival is the use of a travelling exhibition on the escort carrier Campania, which has been converted for the purpose. During the run of the Festival it will call at Southampton, Dundee, Newcastle, Hull, Plymouth, Bristol, Cardiff, Belfast, Birkenhead, and Glasgow. The story told on board the ship will be the same as that on the South Bank, but the method of its telling will, on account of the great reduction in space and other considerations, be very different. This, however, will not affect the relative importance of science in the story of British contributions to civilisation. Design work is already well ahead.

Gas appliances included in the Campania exhibition include gas pokers by William Edgar & Son, Ltd., and Nico Light Engineering Co., Ltd., an FA-Neat single burner unit by Ascot Gas Water Heaters, Ltd., and a refrigerator by Electrolux, Ltd. The land travelling exhibition will have a gas cabinet heater and gas range by Radiation, Ltd., and a Renown Mark IV cooker by the Parkinson Stove Co., Ltd.

It has been explained that the foregoing has been compiled from a number of information sources. We should like in particular to express our thanks to the Gas Council, Mr. L. F. Randall, Manager, Special Services Section, South Eastern Gas Board, and his colleagues, and Dr. F. M. H. Taylor, Managing Director, Thermocontrol Installations, Ltd.

Change of Address.—The Personnel and Editorial Departments of the West Midlands Gas Board have been transferred to headquarters at 6, Augustus Road, Edgbaston, Birmingham, 15. (Telephone EDGbaston 3616.)

Fifty-seven Men, who between them have given 2,593 years to the gas industry in the West Midlands, have been the recipients of various awards. They were presented with suitcases, travelling bags, and clocks as awards for 40 or more years' service. Pride of place in the gathering of veterans, at the Station Hotel, Dudley, was given to Mr. Horatio Wallett, of Coseley, who started at the Bilston gasworks in June, 1896, at the aged of 13. Now with 54 years' service he is mains superintendent.

BRITISH GAS STAFF ASSOCIATION —

(*Concluded from p. 231*)

essential to trade unions but neither the Gas Act nor the National Arbitration Order gives the right of appeal against exclusion'.

The South Suburban branch successfully moved 'That implementation of the national salary agreement having failed generally to reflect the overall increased cost of living, steps be taken to negotiate through the National Joint Council a percentage increase on all salaries and salary scales'.

Bonus Sought

Other resolutions passed included the following:

'That consideration be given to the award of a bonus payable weekly or monthly in recognition of continued service, such bonus to be over and above the existing salary scales and subject to an increase every five years' (Norwich branch).

'That the other trade unions concerned with manual and staff employees in the gas industry be approached with a view to opening inter-union conversations for the purpose of exploring the possibilities of forming a united front for negotiating an industry-wide incentive bonus scheme based on previous proposals of the Association, it being understood that such a scheme would apply to all employees and would not prejudice in any way the recently negotiated settlement of existing co-partnership schemes' (Cambridge and North Thames Northern branches).

'That pressure be brought to bear in the appropriate quarters to institute a pension scheme for all grades at the earliest opportunity' (Bath branch).

A series of resolutions on holidays sought (a) a holiday of three normal weeks, plus three normal working days, annually for staff employees with 20 or more years' continuous service; (b) one additional day for every completed 12 months' service beyond the two normal working weeks' holiday allowed in the present agreement; and (c) special conditions for work on bank, statutory, and local holidays.

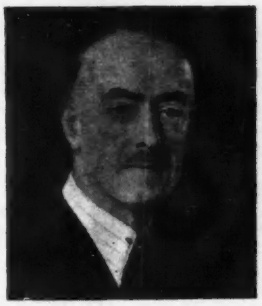
Officers for 1951-1952 were elected as follows: Chairman, W. E. Webb; Vice-Chairman, C. C. Holt; Auditors, H. L. Bristow and G. Lovell.

It was agreed to hold next year's conference at Harrogate towards the end of May.

Housing Statistics, 1949-50, is the title of the first return of housing statistics prepared by the Institute of Municipal Treasurers and Accountants for the year ended March 31, 1950. The return contains details of the housing transactions of county boroughs, the London County Council and a representative selection of non-county boroughs, urban districts, and rural districts. Details included in the tabulation are the number of dwellings owned by the authority, together with a statement of capital costs of typical houses built during the year; a summary of the housing revenue accounts, and an analysis of the weekly rents charged. Selected statistics for all authorities are shown in an abridged summary.

Estimating the Gas Demand

by
W. A. EVETTS
Divisional Engineer,
Watford Division, Eastern Gas Board.



From a paper to the London and Southern Section of the Institution of Gas Engineers on March 27

THE serious housing shortage after the war, brought about by the absence of any but essential building and the destruction and extensive damage to property by enemy action, found local authorities everywhere ready with tentative plans for the building of houses. The passing of the Town and Country Planning Act imposed upon them the added responsibility of planning housing and industry much more comprehensively than had hitherto been the case. Large towns, especially those which had suffered air raid damage, were the subject of special study, for it was felt that by force of circumtsances an opportunity presented itself to clear congested neighbourhoods which had grown up in the past through a complete absence of planning.

The continued growth of Greater London had for years been the cause of much concern and the London County Council appointed a committee, under the chairmanship of Sir Patrick Abercrombie, to consider the whole problem of housing and industry in the Greater London area. The labours of this committee resulted in the Greater London Plan. This plan is so well known that it is sufficient to say that it is a comprehensive survey of an area of about 30 miles radius of London, with proposals for the decentralisation of 1,300,000 of the pre-war population of 10 mill., about 478,250 of whom it was proposed should be housed in satellite towns of such a size that they would be self-contained communities, living, working, and spending their leisure locally. A town of 60,000 persons was considered a suitable size to provide these facilities and amenities. With certain modifications agreed with the local authorities covered by the report, the Greater London Plan has in the main been accepted.

The Town and Country Planning Act requires local planning authorities—*i.e.*, county councils or county boroughs, to prepare by June, 1951, complete planning proposals and these will no doubt be available to all concerned in the provision of utility services.

The Watford division is almost entirely within the area considered by the Greater London Plan and for its size it is probably scheduled for greater expansion than any other area in the country. It includes the three satellite towns of Hemel Hempstead, Stevenage, Welwyn and Hatfield, the two large London County Council estates at Oxhey and Borehamwood, besides the planned expansion of existing towns. The more determined effort to plan development of housing and industry rather than allow the haphazard growth which took place before the war, if carried into effect, permits a long-term plan of development of the gas supply with some degree of confidence.

In view of the anticipated and rather abnormal development that had already commenced, the author was asked immediately after vesting date to prepare a comprehensive development plan for the Watford division of the Eastern Gas Board. A considerable amount of preliminary investigation work had already been carried out so far as the area covered by the former Watford and St. Albans Gas Company was concerned and this paper has been prepared setting out thoughts and speculations on the gas demand on which the report was based.

Increase in Population

The first step was, of course, to obtain reliable estimates of the anticipated increase in population. These were obtained from and discussed with the various local authorities and county planning officers, from whom information was also obtained with regard to areas designated for industrial development.

Table 1, extracted from the development report, gives the estimated increases in population and gas demands in the various towns and districts.

In estimating the number of dwellings it is assumed that there will be an average of 3½ persons per dwelling, a figure used by most planning authorities. The next step was to estimate the number of new domestic gas consumers. It was assumed that the householder would be given freedom of choice in regard to the selection of gas or electricity, although it was by no means certain at that time that this would be the case. The Stevenage Development Corporation were strongly in favour of district heating and similarly at Hemel Hempstead there was a tendency to lean in the same direction.

While some blocks of flats will be heated from a central boiler house and a similar arrangement may be introduced in the commercial centres, the general adoption of district heating in these two new towns has not been pursued, no doubt on they are developing at Oxhey and Borehamwood and there is account of cost. The London County Council has not contemplated the introduction of district heating on the two estates no evidence that it is being considered by the Welwyn and Hatfield Development Corporation.

ULTIMATE DEMAND
TABLE I.

	Additional Population	Additional Dwellings	Additional Consumers	Domestic Consumers 1948	Domestic Consumers Ultimate Total	Additional Requirements Mill. cu. ft.			Requirements 1948 Mill. cu. ft.			Ultimate Requirements Mill. cu. ft.		
						Dom.	Ind.	Total	Dom.	Ind.	Total	Dom.	Ind.	Total
Watford and Bushey	7,500	2,165	1,535	25,625	27,160	51	281	332	839	350	1,189	890	631	1,521
L.C.C. Estate, Oxhey	16,000	3,700	2,800		2,800	92	92	184				92	92	184
Total Watford District	23,500	5,865	4,335	25,625	29,960	143	373	516	839	350	1,189	982	723	1,705
Rickmansworth	12,750	3,650	2,750	7,675	10,425	119	36	155	290	36	326	409	72	481
St. Albans	16,750	4,790	3,590	13,910	17,500	118	210	328	470	143	613	588	353	941
London Colney	2,350	670	500	1,013	1,513	17	16	33	33	21	54	50	37	87
Radlett	6,500	1,860	1,390	1,295	2,685	46	10	56	51	5	56	97	15	112
Elstree including L.C.C. Estate ...	23,000	6,600	4,950	2,711	7,661	163	119	282	106	141	247	269	260	529
Harpenden	3,500	1,000	750	5,534	6,284	25	39	64	188	29	217	213	68	281
Hatfield	13,000	3,700	2,770	2,849	5,619	91	136	227	89	85	174	180	221	401
Welwyn Garden City	21,500	6,000	4,500	2,403	6,903	148	374	522	75	209	284	223	583	806
Old Welwyn, Knebworth, etc.	6,000	1,730	1,300	2,000	3,300	48	—	48	62	—	62	110	—	110

ULTIMATE DEMAND
TABLE I.

	Additional Population	Additional Dwellings	Additional Consumers	Domestic Consumers 1948	Domestic Consumers Ultimate Total	Additional Requirements Mill. cu. ft. Dom.	Ind.	Total	Requirements 1948 Mill. cu. ft. Dom.	Ind.	Total	Ultimate Requirements Mill. cu. ft. Dom.	Ind.	Total
Hemel Hempstead	38,000	11,000	8,250	6,099	14,349	262	440	702	224	46	270	486	486	972
Bovingdon	1,170	335	251	249	500	9	—	9	8	—	8	17	—	17
Kings Langley and Chipperfield	3,250	928	700	1,216	1,916	24	—	24	42	—	42	66	—	66
Abbots Langley	2,500	714	536	1,665	2,201	17	—	17	58	—	58	75	—	75
Chesham	10,500	3,000	2,250	3,795	6,045	69	35	104	116	35	151	185	70	255
Total Watford Group	184,270	51,842	38,822	78,039	116,861	1,299	1,788	3,087	2,651	1,100	3,751	3,950	2,888	6,838
Stevenage	54,000	13,500	9,494	1,756	11,250	305	371	676	66	—	66	371	371	742
Luton	40,000	11,500	8,500	32,316	40,816	300	420	720	1,000	480	1,480	1,300	900	2,200
Dunstable	13,000	3,700	2,800	5,570	8,370	93	93	186	205	73	278	298	166	464
Hitchin Area	6,000	1,700	4,070	11,030	15,100	143	71	214	358	71	429	501	142	643
Letchworth	11,000	3,140	2,360	4,650	7,010	71	71	142	137	101	238	208	172	380
Baldock	2,000	570	428	1,117	1,545	13	7	20	29	15	44	42	22	64
Berkhamsted	8,800	2,400	1,800	3,326	5,126	60	20	80	123	37	160	183	57	240
Aspley Guise Woburn	1,170	330	250	583	833	9	2	11	17	4	21	26	6	32
	320,240	88,682	68,524	138,387	206,911	2,293	2,843	5,136	4,586	1,881	6,467	6,879	4,724	11,603

Before the war the percentage of dwellings using gas for domestic purposes was approximately 90 in the area of the former Watford and St. Albans Gas Company as a whole, except in Welwyn Garden City, a new town commenced in 1922, where the percentage was about 58. Here it was felt, rightly or wrongly, that the scales were weighted against the gas undertaking. Throughout the war existing domestic consumers of gas or electricity were not allowed to change from one service to the other, and as no new houses had been built there was little guide as to where the consumer's choice would lie. It was felt that while the high pre-war percentage would suffer some reduction, there was still a majority in favour of gas. Somewhat arbitrarily perhaps, it was decided to base the estimates on the assumption that 75% of all new dwellings would use gas for coking, laundering, and some water heating. Up to the present this figure has turned out to be approximately correct, although it is disturbing to find that some local authorities in the endeavour to keep down the already high cost of building have decided that 50% of new houses will be supplied with electrical appliances and 50% with gas apparatus.

Domestic Consumption

The estimated consumption per domestic consumer had next to be decided. In common with many other places, consumption per domestic consumer in the Watford area increased considerably during the war.

During the six years prior to the war the average prepayment consumption was fairly steady at about 85 therms per annum. The quarterly consumer between 1934 and 1937 consumed on an average about 160 therms per annum, dropping to 140 during 1938-39. The average consumption of both classes of consumer increased considerably during 1939 and 1940, due undoubtedly to the influx of population from London. Taking the average consumption of both classes of consumer, there was a considerable increase during the years 1943-46, rising to a peak of 155 therms per annum in 1947, since when there has been a drop each year. The average consumption of both classes of consumer during the year ended March 31, 1950, was 141 therms. There has been a considerable increase in the industrial and commercial load since 1939.

The drop in the average consumption per consumer between 1936 and 1939 may have been due to the considerable increase in the number of houses built in the area, and it is quite certain that the rapid increase during the first two years of the war was due to the influx of people from London. From 1941 there was a steady drift back of evacuated people to their former homes, whereas the gas consumption per consumer increased, particularly after 1943. It is suggested that this was partly due to a shortage of solid fuel and in part to the increased amount of money in the consumer's pocket. The increase in the number of persons per dwelling after the end of the war would be due to the return of men and women from the services, and the drop since 1947 will be due to new building with consequent drop in overcrowding—*i.e.*, a married son or daughter formerly living at home securing a new house. The drop in consumption per consumer over the peak reached in 1947 of 155 therms to 141 therms at the beginning of 1950 is, it is suggested, due to three reasons:—

(1) Less severe weather conditions during the winters of the two following years.
(2) Decrease in the number of persons per dwelling.
(3) Reduction in the purchasing power of the consumer's income not fully compensated for by increase in wages.

All these conjectures are, of course, much more within the province of people engaged on market research, and they are among the factors stressed by Stirling Everard in his paper presented to the Institution of Gas Engineers in 1948, but their importance to the engineer is obvious. In Fig. 1 of his communication, Stirling Everard gives the relationship between the number of rooms occupied and the amount of gas sold to prepayment consumers. Where the number of rooms occupied is four, the consumption is about 138 therms per annum. In Fig. 2 of that paper is shown the relationship between the number of persons occupying three room dwellings and the amount of gas sold to them (prepayment consumers only). From this diagram, where there are four persons per household, consumption is about 142 therms per annum. If one can read these two diagrams together, where the number of rooms occupied is four and the persons per household is four, the consumption per annum would appear to be about 140 therms. This agrees very closely with the consumptions recorded in the present paper, which show an average of 141 therms per annum in 1949 when the number of persons per dwelling is estimated at 4.1. I think it would be reasonable to assume that in the Watford group the number of occupied rooms is about four per dwelling. The problem for the engineer is to find a figure on which he can safely base his estimates for the future.

When the development report for the Watford division was prepared an average figure of 150 therms per annum per domestic consumer was taken. This may prove to have been too high. If the relation between consumption and persons per dwelling during 1949 is compared with the consumption in 1935, when the number of persons per dwelling was about the same, the increase in consumption is 31 therms per annum. If, as more houses become available, we reach the position where the number of persons per dwelling is the same as in 1939—*i.e.*, 3.8—and allow the same increase in consumption, it would appear that we may expect to obtain an average consumption of about 137 therms per annum. It is interesting to note that this was the average consumpion of 1,750 consumers on the new London County Council estate at Oxhey during 1949.

The amount of fuel used by a householder must depend very largely on his income. To what extent is the increased gas demand per consumer due to the reduction in the supply of house coal? In a statement recently issued by the Coal Merchants' Federation of Great Britain it was pointed out that in 1938 a population of 46¼ mill. consumed 44.2 million tons of house coal compared with 29-30 million tons now allowed for a population of 48½ mill., a reduction of about one-third.

Discussing this reduction with a coal merchant, it appears that the greatest reduction in consumption of house coal is

among the higher income group. Houses that consumed 10, 15, and 20 tons of coal a year before the war are now limited by rationing, while households in the lower income group are, on the average, taking only about 25% less than before the last war; the pre-war consumption being about 40 cwt. per year compared with 30 cwt. in 1950. If the efficiency of utilisation in the home is about 20%, the reduction in the amount of heat from solid fuel is about 30 therms. Taking the figures for gas consumption given in this paper, in 1938 the average pre-payment consumer used 85 therms of gas per annum and 137 therms in 1950, an increase of 52 therms. If the efficiency of utilisation of gas is 60%, the added heat obtained from gas is 31 therms. Roughly one could say that coal has been replaced by gas.

An approximate estimate of the total expenditure on coal and gas in 1938 and 1950 may be of the following order:—

1938.				1950.			
2 tons of coal at 50s. per ton ...	£5	0	0	1½ tons of coal at £5 per ton ...	£7	10	0
85 therms of gas at 1s. per therm	£4	5	0	137 therms of gas at 1s. 6d. per therm ...	£10	5	0
	£9	5	0		£17	15	0

Increase £8 10s. equals 92%.

The total cost of coal and gas to the householder, therefore, is now nearly double the pre-war figure, roughly proportional to the increase in wages, and the allowance for fuel in the household budget is proportionately the same as it was in 1938.

It would be useful if our market research friends could tell us if there is a likelihood of the consumption per consumer falling if house coal supplies improve, also if it is unreasonable to expect an increased consumption per consumer without a genera! rise in the standard of living. When more private building is permitted the average consumption of the domestic consumer should tend to rise again if gas retains the popularity it has enjoyed in the past, and I can see no indication that this is not so. On the other hand, the high percentage of new houses in which coke fires with back boilers are installed will tend to a reduction in the water heating load.

For the present we are adhering to a figure of 150 therms per domestic consumer in estimating future demands.

Non-Domestic Consumption

When we come to consider non-domestic consumption we have a more difficult problem to solve. The area covered by the Watford division, although to a small extent a dormitory for London, is very largely self-contained. There is a great variety of industry comprising, in the main, printing, food processing, light engineering, aircraft and motor manufacture. In the Watford group alone there are 42 different industries using gas.

In the Greater London Plan the development of industry in the outer areas is related to the planned expansion of population. The intention is to avoid people travelling long distances to work and that there should be sufficient industry to employ the population locally, not only in the satellite towns. Where towns such as Watford are considered to be already sufficiently large, it is proposed to develop housing in adjacent smaller towns and communities and allow only limited housing development in Watford, but sufficient industrial expansion to employ the new population.

Table II shows the non-domestic demand in the various areas for the year ended March 31, 1950.

The high percentage of non-domestic demand in Welwyn Garden City, Letchworth, and Elstree stands out well above the other districts. At Welwyn Garden City the position is a little masked by the lower than average domestic load, and if this is adjusted to what might be considered normal conditions, the non-domestic load would be about 60%. Again, about one-third of the total non-domestic load is taken by one large consumer, so that the percentage is higher than could normally be expected. At Elstree the industrial load increased at a very great rate during the war, mostly due to one large consumer who has now moved out of the area. Furthermore, the domestic demand is low in relation to the number of people employed in the area, as many workers travel in from London.

Welwyn Garden City and Letchworth Garden City are the two communities planned by Ebenezer Howard, the forerunner of all town planners and undoubtedly they form the model on which all new towns will be developed, although they will be larger than Howard contemplated. Both are complete communities in that the inhabitants work and live locally. The non-domestic demand in these two new towns should therefore prove a reliable guide to the future requirements in the division.

In the Watford group the non-domestic gas demand has increased from 20.6% in 1935 to 33.8% in 1949. This increase is due not only to the establishment of new industry, but also to the adoption of gas for processes and uses previously supplied with other fuels. Between 1936 and 1949 the non-domestic demand in the Watford group increased by 257%, while the domestic demand increased by 88% during the same period.

TABLE II.

District.	Non-Domestic Sales. Therms.	% of Total Sales.
Watford	1,833,976	33.1
St. Albans	796,543	25.9
Elstree	747,069	51.4
Hemel Hempstead ...	288,804	17.1
Hatfield	439,653	46.5
Welwyn Garden City ...	1.076,392	69.8
Harpenden	227,972	22.1
Rickmansworth	319,943	22.7
Chesham	144,080	19.7
Watford Group	5,924,432	33.8
Luton	1,839,297	28.8
Hitchin	441,599	20.0
Dunstable	303,853	27.2
Letchworth	492,263	47.2
Berkhamsted	184,937	24.2
Baldock	66,840	35.6
Woburn Sands	16,007	14.9
Watford Division	9,269,228	31.6

The trend is definitely in the direction of the non-domestic user taking a higher proportion of the total gas, and it is not unreasonable to assume that the overall non-domestic demand in the urban areas will be similar in proportion to that obtaining in Letchworth and Welwyn Garden City. It has been decided, therefore, in the case of all new development, except that which is obviously rural, to estimate the non-domestic demand as being equivalent to the domestic demand—*i.e.*, 50% of the total demand, plus an allowance for the conversion of existing industry from other fuels to gas; and it may be of interest to state that ultimately in the division as a whole the gas demand for non-domestic purposes is estimated to be 40%.

Phasing of Development

In developing plans for gas supply the division was divided into the areas of demand, and for distribution and storage purposes each area was separately treated for daily and maximum hourly demands, although it is proposed to integrate the various areas as development proceeds. Altogether there are 24 such areas. In determining manufacturing capacity the areas were then grouped around the centres of production, so that the domestic and non-domestic demand could be treated for the group as a whole.

The rate of development has been estimated after discussing the question with the various local authorities and development corporations. There is obviously scope for a large margin of error here, but as far as possible we have tried to be realistic. If development proceeds as planned the gas demand will increase at an average annual rate of 3.7% for a period of 16 years. For the first five years a slightly higher rate has been allowed to provide for the anticipated drive in housing. An

increase of 3.7% per annum does not appear to be on the high side if compared with the growth, amounting to 4.2% per annum, which took place in the Watford group of companies in the 10 years before the war, and in Luton at the rate of 4.5% during the same period. The population in these two areas together comprises 75% of the division.

Gas estimates for each year from the period 1949-64 were prepared for each district. On these estimates outline plans for the development of works and distribution systems were prepared. It cannot be pretended that the estimates are more than a reliable guide, but they do allow of plans being prepared with some degree of confidence and estimates of capital expenditure made for the first five years.

Maximum Week and Maximum Day's Demand

From the estimates of annual demand the maximum week and maximum day in each district have been determined. It has been the practice for some years to prepare annually the estimate of the weekly gas demands for a period of 12 months ahead. Where areas are already integrated and supplied by more than one works, the output from each works is predetermined. The estimated amount of coal gas and water gas to be produced during each week is shown to enable each works engineer to determine his repair programme.

We are fortunate in having had during the winter, 1946-47, a severe cold spell, comparable with that experienced in 1929. The lowest average daily temperature recorded in the Watford group was 19°F. and for a week 27°F. In estimating future maximum days these temperatures are accepted as the lowest that are likely to be experienced. In the Watford group in January, 1947, the maximum day was 0.44%, or 1/228 of the year. It is interesting to find that the potential maximum day during the period 1938-50, during which period the demand has nearly doubled, has remained steady around the same percentage or fraction.

The maximum days expressed as fractions and percentages of the year's demands in the various districts, together with the percentages of non-domestic sales, are shown in Table III.

One might have expected to find the maximum day to be a lower proportion of the annual demand as the percentage of non-domestic sales increases, although of course it would also depend on the proportion of heating load of the non-domestic sales. But the table discloses no relation between maximum day and non-domestic sales; there is a closer relationship between consumption per domestic consumer and the maximum day's demand.

TABLE III.

District.	Maximum Day's Output Fraction of Year	Maximum Day's Output % of Year	Non-Domestic Sales as % of Total Sales.
Berkhamsted	1/204	0.49%	24.2
Chesham	1/208	0.48%	19.7
Watford Group	1/227	0.44%	33.8
Dunstable	1/232	0.43%	27.2
Luton	1/238	0.42%	28.8
Hitchin	1/238	0.42%	20.2
Letchworth	1/238	0.42%	47.2
Woburn Sands	1/244	0.41%	14.9
Baldock	1/263	0.38%	35.6

At Baldock there is a large catering load, amounting to 36% of the total non-domestic demand. This load would tend to reduce the magnitude of the maximum day in relation to the year. Woburn Sands comprises three rural communities, where the annual demand is 28 mill. cu.ft. and the maximum day occurs on Sunday.

No actual information is available as to the proportion of the maximum day's demand which is due to domestic consumption only. Where the consumption per domestic consumer tends to be high, as at Berkhamsted, it would appear to be mainly due to added heating load. It is reasonable to expect that consumers there utilise gas for heating to a greater extent than, say, the average consumer in Letchworth, where the annual load factor is higher and the maximum day a lower percentage of the annual output.

Non-Domestic Heating

The following table gives details of the heating load in three factories where gas for space heating is metered separately:—

Year ended December 31, 1950.

Factory.	Annual Consumption. Cu. Ft.	Potential Maximum Day. Temp.: 25°F.	Maximum Day % of Annual Load.	Load Factor.
No. 1	13,900,000	200,000	1.44	19.0%
No. 2	4,330,000	54,000	1.25	22.0%
No. 3	704,000	10,000	1.28	21.4%
	18,934,000	264,000	1.39	19.7%

Factory No. 1 works 24 hr. a day, 5 days a week.
Factory No. 2 works 24 hr. a day, 5 days a week.
Factory No. 3 works 8 hr. a day, 5 days a week.

All these factories are equipped with overhead radiant heaters.

As a further example of factory space heating, the average daily consumptions for central heating taken from weekly meter readings in a group of sectional factories at Welwyn Garden City. (Factory No. 4.)

The maximum recorded weekly consumption during this season was 393,000 cu.ft. The factories are working five days a week so that the average daily consumption during this week was 79,000 cu.ft. This gives an annual load factor for the year 1949-50 of 32.4%, compared with 26.3% for factories 1, 2 and 3, which are equipped with overhead radiant heaters. Heating in the sectional factories is carried out by gas-fired boilers thermostatically controlled, whereas the control in the other three factories is not thermostatic but adjusted by the foreman or chargehand.

For predicting day-to-day gas demand the degree day method is not in favour. D. G. Rose, in his paper, 'A Background to Some Economic Problems in the Gas Industry,' has some comments on this method in relation to its use in estimating daily demands, and generally it would appear that this method is more useful in estimating the consumption of fuel required for heating a given building.

The examples given serve to confirm what we already know, that the load factor for the non-domestic heating demand is very low.

It is of interest to work out the cost in 1950 of heating factory No. 1 by electricity. The maximum day's gas demand at a temperature of 30°F. is estimated to be 170,000 cu.ft. of 500 B.Th.U. gas, or 850 therms. Allowing 90% efficiency for this type of heating, the effective heat output is 765 therms, equivalent to 22,185 kWh at 100% efficiency. The load is on for 24 hours a day, so that the maximum demand is 924 kW. The gas demand for the year was 13,900,000 cu.ft., equivalent to 1,814,000 kWh at the same relative efficiency.

The charge for electricity would have been as follows:—

	£
Maximum demand charge.	
924 kW at £4 10s. per kW per annum	4,158
Current charge.	
1,814,000 kWh at 0.671d. per kW	5,067
Total charge for year (1.22d. per kWh)	£9,225

The equivalent charge per therm of electricity is 35.4d.

It is doubtful if so prohibitive a charge would be entertained. If the maximum day's demand can be considered as the maximum demand (this is a 24 hour load), the maximum demand charge per therm of electricity $= \frac{£4,158}{765} = £5.44.$

For gas this is equivalent to a maximum demand charge of $\frac{£4,458}{850} = £4.89$ per therm on the maximum day.

Thinking in terms of gas, if we take the standing charge only of £4,158 and divide by the annual gas consumption of this factory, the cost per therm is 14.35d.

There appears to be some merit in establishing a maximum demand charge.

Looking at a rather broader picture—the Watford group as a whole in 1950—the potential load on the maximum day due to space heating was estimated to be 8.9 mill. cu.ft. out of a total potential demand of 17.5 mill. cu.ft. During 1950 the estimated heating load was 838 mill. cu.ft., the load factor 25.8%, and the maximum day heating demand 1.06% of the year's heating load, both based on the potential maximum day. If the maximum day's demands that I have given for space heating factories 1, 2 and 3 are at all typical it is reasonable to assume that the domestic heating load has the effect of reducing the maximum day's heating demand from 1.39% to 1.06% of the annual heating load, and that the domestic heating load has a higher load factor. This might be expected, as in the average home solid fuel fires will take a higher proportion of the heating load in the winter months. Any curve that we plot of outputs against temperature levels out at a temperature of just over 60°F. For each degree below 60°F. there is an increase in output and the best curve through the daily consumptions as temperatures drop is a straight line indicating that the percentage of additional output for each degree drop in temperature is progressively less. This, I suggest, is due mainly to the higher load factor of the domestic space heating load and to the impact of solid fuel coming into use during the winter months.

Non-Domestic Process Load

The non-domestic process load has a comparatively high annual load factor. In the Watford group the annual load factor based on quarterly consumptions is 93.6%. On a monthly basis the annual load factor is lower, as would be expected.

Examples are given (Table IV) of three factories operating different processes where there is a considerable process load. Taking the three factories as a whole the load factor (annual demand divided by maximum day's demand by 365) is 65%.

TABLE IV.

Factory.	Process.	Daily Average of Maximum month.	Annual Consumption mill. cu. ft.	Load Factor.
No. 5	Refrigerators	518,000	125.3	66.3%
No. 6	Breakfast food	382,000	84.2	60.3%
No. 7	Motor accessories	265,000	52.3	54.5%
Daily average of aggregate maximum month		1,096,000	261.8	65.5%

The combined maximum average daily demand occurs in July. This is due to the increased demand for the breakfast food during the summer months. Generally I think it would only be safe to consider the maximum day of non-domestic demand as coincident with the maximum day of the winter.

Before closing this section dealing with the maximum day's demand I should like to make the point that in an area where the demand is entirely domestic the maximum day will almost invariably be on a Sunday. Recordings recently made on the Oxhey estate show that the Sunday load was 17.3% of the weekly consumption; 26% above the average weekday; and 14.7% above Monday's demand.

If these records can be taken as a guide it appears that when the non-domestic load is under 10% the maximum day will be on a Sunday, except, of course, such loads as catering, bread baking, and public lighting, which are usually in operation seven days a week. Woburn Sands is a case in point. If the bread baking and public lighting loads are excluded the non-domestic demand is 8.2% and the maximum day occurs on a Sunday.

Maximum Hour

In all districts in the division except Letchworth the maximum hour occurs between 12 noon and 1 p.m. on Sunday. In the Watford group, if we take the maximum hour's delivery during the past winter and divide it by the total number of domestic consumers in the group, we arrive at a figure of 18.4 cu.ft. per consumer. There will undoubtedly be some non-domestic consumption during this period, but 18.4 cu.ft. is a useful yardstick and this figure has varied little over the past four to five years. Table V shows the maximum hour's delivery in the Watford group, Letchworth, and Berkhamsted, where there is a varied percentage of non-domestic demand:—

TABLE V.

	Sunday Maximum hour, cu.ft. per consumer	Non-Domestic Sales, % of annual
Berkhamsted	17.8	24.2
Watford group	18.4	33.8
Letchworth	19.3	47.2

The rise in the apparent consumption per hour of the domestic consumer as the percentage of non-domestic sales increases would be expected.

At Letchworth the maximum hour occurs on a weekday and is about 15% higher than the Sunday maximum. This is due to the higher percentage of industrial load.

During the past few weeks the gas demands of the whole of the new London County Council estate at Oxhey have been recorded on different days of the week. The number of consumers and apparatus fixed at the time the records were made, were as follows:—

Number of consumers ...	3,025 (every house has a gas supply and meter).
Cookers	2,293—75.7%
Wash boilers	1,844—60.8%
Coke grates	2,555—84.3%
Gas pokers	458—15.1%
Fires	553—18.2%

On the Sunday the consumption during the maximum hour was equivalent to 13.5 cu.ft. per consumer, reaching a peak of 14.5 cu.ft. just before 1 p.m. Based on the number of cookers installed, the consumption was 17.9 cu.ft. during the maximum hour with a peak consumption of 19.2 cu.ft. per cooker.

The 732 households on this estate without gas cookers can, I suggest, hardly be called gas consumers. On going through the records of 1,500 consumers on the estate who had had a full year's consumption, 6.3% of them consumed an average of 16 therms per annum and 15.5% under 30 therms per annum, and here I should mention that when arriving at the average of 137 therms per annum on this estate mentioned earlier in the paper the households taking less than 30 therms a year have been excluded. If I am criticised for this, I do not think I should be justified in assuming that I have 100% of the households on this estate as gas consumers when in effect just over 24% of them presumably have electric cookers.

The total consumption over the hours 11 a.m. to 2 p.m. was 107,000 cu.ft., an average of about 47 cu.ft. per cooker. I do not know how much gas it takes to cook the average dinner, but it would appear that almost every gas cooker was at work on this day and the diversity factor was zero.

The effect of temperature on the Sunday peak is not nearly so marked as on the daily demand. During the summer months the Sunday maximum hours averaged in the Watford group about 16 cu.ft. per consumer, or 87% of the maximum hour on the coldest winter Sunday in 1950. In Berkhamsted, where there is a considerable domestic heating load, the respective figures were 17.8 cu.ft. per consumer during the winter and 15.2 cu.ft. during the summer; the summer being 86% of the winter maximum.

In planning new distribution systems a Sunday maximum hour equivalent to 20 cu.ft. per domestic consumer has been allowed.

Weekday Maximum Hour

The weekday maximum hour again occurs between 12 noon and 1 p.m. in all districts in the Watford division. Observations made a few years ago in districts where the gas demand is predominantly domestic indicated that the maximum hour occurring on a weekday was between 8 and 10 cu.ft. per consumer. On the London County Council estate at Oxhey the figure is just under 7 cu.ft. per consumer, or 9 cu.ft. per cooker

installed. On this estate the weekday maximum hour actually occurs at between 5.30 and 6.30 p.m., no doubt due to the fact that by far the larger proportion of the working population travels up to the London area to work.

When estimating for the future, 12 cu.ft. per domestic consumer has been allowed between 12 noon and 1 p.m.

The maximum weekday hour due to the non-domestic demand, or rather its affect upon the overall maximum hour, can, as I have already stated, only be inferred. By taking 9 cu.ft. as the average consumption per domestic consumer during the weekday maximum hour the division of the maximum hour into the two types of consumer in the Watford group is as follows:—

TABLE VI.

Year 1949/50.	Estimated Maximum hour Domestic Load.	Estimated Maximum hour Non-Domestic Load.	Total Maximum hour Domestic & Non-Domestic.
Maximum hour, cu. ft. ...	835,000	390,000	1,225,000
Annual demand, mill. cu. ft....	2,641	1,348	3,989
Maximum hour, % of year ...	0.031	0.029	0.030

In Letchworth, where the maximum hour occurs on a weekday, the division between domestic and non-domestic demand, again using 9 cu.ft. per domestic consumer would be approximately as follows:—

TABLE VII.

Year 1949/50.	Estimated Maximum hour Domestic Load.	Estimated Maximum hour Non-Domestic Load.	Total Maximum hour Domestic & Non-Domestic.
Maximum hour, cu. ft. ...	41,000	65,000	106,000
Annual demand, mill. cu. ft....	130	117	247
Maximum hour, % of year ...	0.031	0.055	0.043

At present there is insufficient knowledge of the make-up of the non-domestic load to read more into these figures than the bare information discloses. Particularly is information lacking on the relative proportions of the non-domestic heating and process loads during the maximum hour. However, they are of use as a guide in estimating for the future, and by patiently collecting new details from time to time it is hoped to get a clearer insight into the factors affecting the maximum week-day hour and the maximum day's demands.

From examination of hourly output charts it would appear that the heating load is fairly evenly spread over the 16 hours of the day from 7 a.m. to 11 p.m. There is a slight increase in rate at breakfast time and some additional consumption during the night hours.

Day-to-Day Estimation of Gas Demand

This subject has been covered so amply by D. G. Rose in his paper, 'A Background to Some Economic Problems in the Gas Industry,' presented to the Institution of Gas Engineers in 1949, that one can add little on the subject that is of any value. It is a fascinating study, but I think some of the examples I have given of typical heating and process loads show that one cannot continue the search for relationship between gas demand and temperature too far. The heating load would be strictly related to temperature changes only if the relative temperatures inside houses, factories, and shops were in turn so controlled that they were closely related to the outside air temperatures, but it would be too much to expect that this is the case, although one might expect that by the law of averages the relation would be on the whole fairly close. But the non-domestic process load is also subject to considerable variations which are quite unpredictable.

If we take the case of Factory No. 6 manufacturing breakfast foods, in November, 1950, when the average temperature was 45° the demand averaged 350,000 cu.ft. a day. In December, when the temperature was 42°, the demand was only 255,000 cu.ft. a day, a difference of over 37% on the lower figure. Taking factories 5, 6, and 7 together, in March, 1950, the average daily demand was 850,000 cu.ft. and in July, 1,100,000 cu.ft., a difference of over 31%. The variations in these loads will be governed by economic conditions without any regard to temperature.

It is useless to search for a precise factor where there are many imponderables. I think the most satisfactory approach is to draw the best line through the plottings of estimated outputs against temperatures taking the previous year as a basis and using separate graphs for such different days of the week as may be necessary and for different seasons of the year. On the winter graph I think it is safe to extrapolate for the most severe weather conditions. For about 60% of the time the day-to-day estimates will be within + or − 2%; the remainder will lie within + or − 5%. At least this is our experience.

I would here like to say a word in praise of the day-to-day forecasts of the Meteorological Office. They are invaluable, and although we like to poke fun at them occasionally I think we should all admit that without them we should feel lost, and perhaps that is the best praise one can give. In a recent booklet issued by the Meteorological Office, entitled 'Your Weather Service,' it is claimed that the weather forecasts are correct to the extent of 90%.

Annual Load Factor

The annual load factors based on potential maximum days, together with the consumption per domestic consumer, and the percentage of non-domestic load for the various districts in the division, are shown in the table:—

TABLE VIII.

District.	Load Factor %	Consumption per domestic consumer Therms	Non-domestic % of total sales
Berkhamsted	55.8	168.5	24.2
Chesham	57.0	142.0	19.7
Watford Group	62.2	141.0	33.8
Dunstable	63.9	141.5	27.2
Hitchin	65.0	134.0	20.2
Luton	65.3	137.0	28.8
Letchworth	65.4	121.4	47.2
Woburn Sands	66.0	104.5	14.9
Baldock	72.6	105.3	35.6

Here, again, there is a closer relationship between the sales per consumer and the load factor, and little if any between percentage of non-domestic sales and the load factor. One can, of course, be too sweeping in this generalisation, but the table does, I think, emphasise the point I made previously that where there is a relatively high consumption per consumer it is due to space heating. Woburn Sands and Baldock are exceptions. In the former the maximum day occurs on Sunday and Sunday has the highest daily consumption during the week, and in the latter there is a large catering load and the daily output is practically steady throughout the week.

Letchworth with non-domestic sales nearly 50% of the total may be somewhat typical of what we can expect in the satellite towns, though we hope the consumption per consumer will be considerably higher than the 121.4 therms.

Analysis of Domestic and Non-Domestic Demands

Earlier in the paper I mentioned that an attempt had been made to ascertain the division of the load on the maximum day between domestic heating, domestic cooking, etc., non-domestic heating and non-domestic process. Some of the statements which follow are highly speculative.

I start by making the assumption that on the average all domestic consumption up to 120 therms per annum is for cooking, water heating, etc., and that consumption above 120 therms is due to space heating. If this is at all near the truth it would only apply to the climate obtaining in the area with which I am concerned. I further assume that during the past winter the maximum day for non-domestic heating was 1.1% of the annual non-domestic heating load, a figure I have taken from the examples given in this paper, but not the potential maximum day.

To obtain some basic information I have taken Woburn Sands, a rural community, where the non-domestic load is so small as not to upset the deductions I have made. The average consumption per domestic consumer is 104.5 therms per annum and I have assumed that there is no space heating load. The maximum day occurs on a Sunday and throughout the year the Sunday load is the highest in the week. I have already expressed the opinion that when the non-domestic

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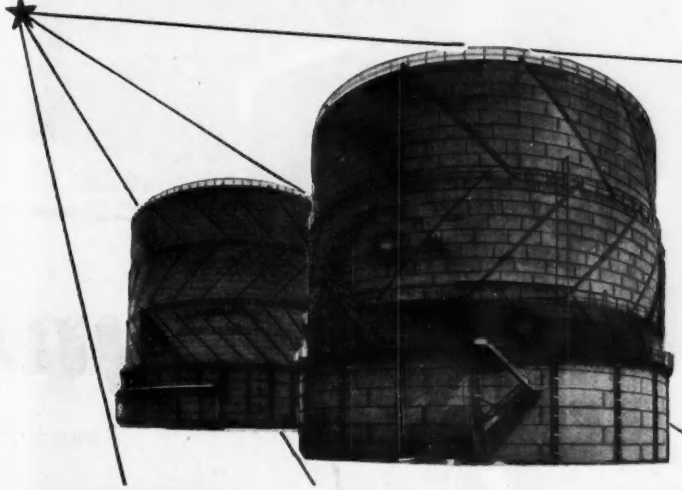

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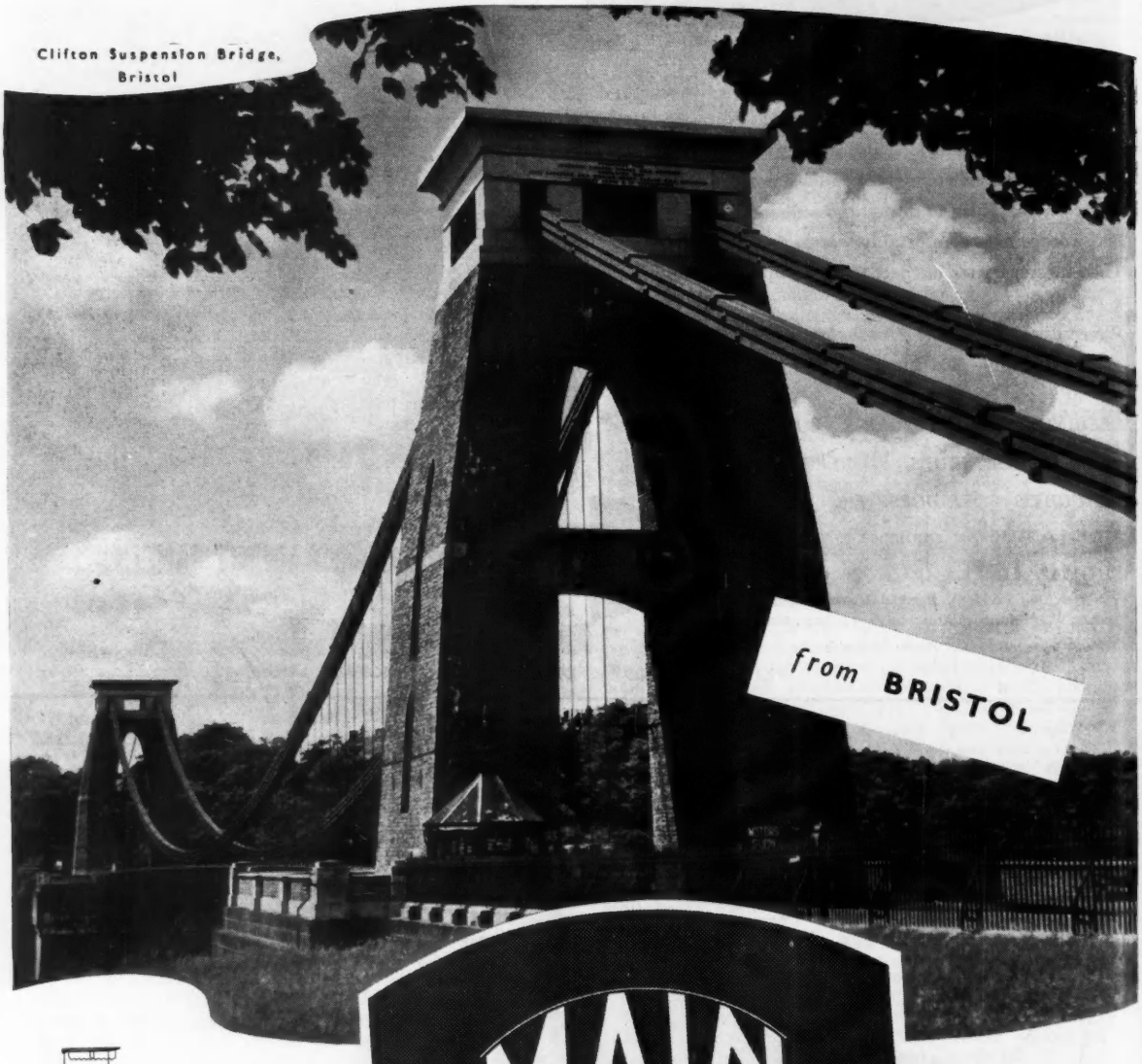

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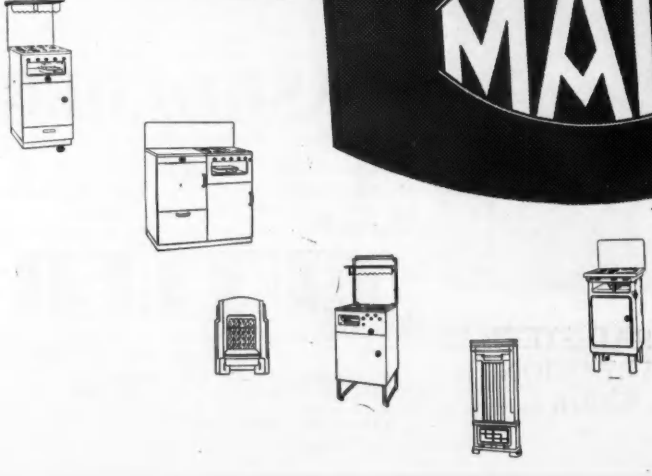

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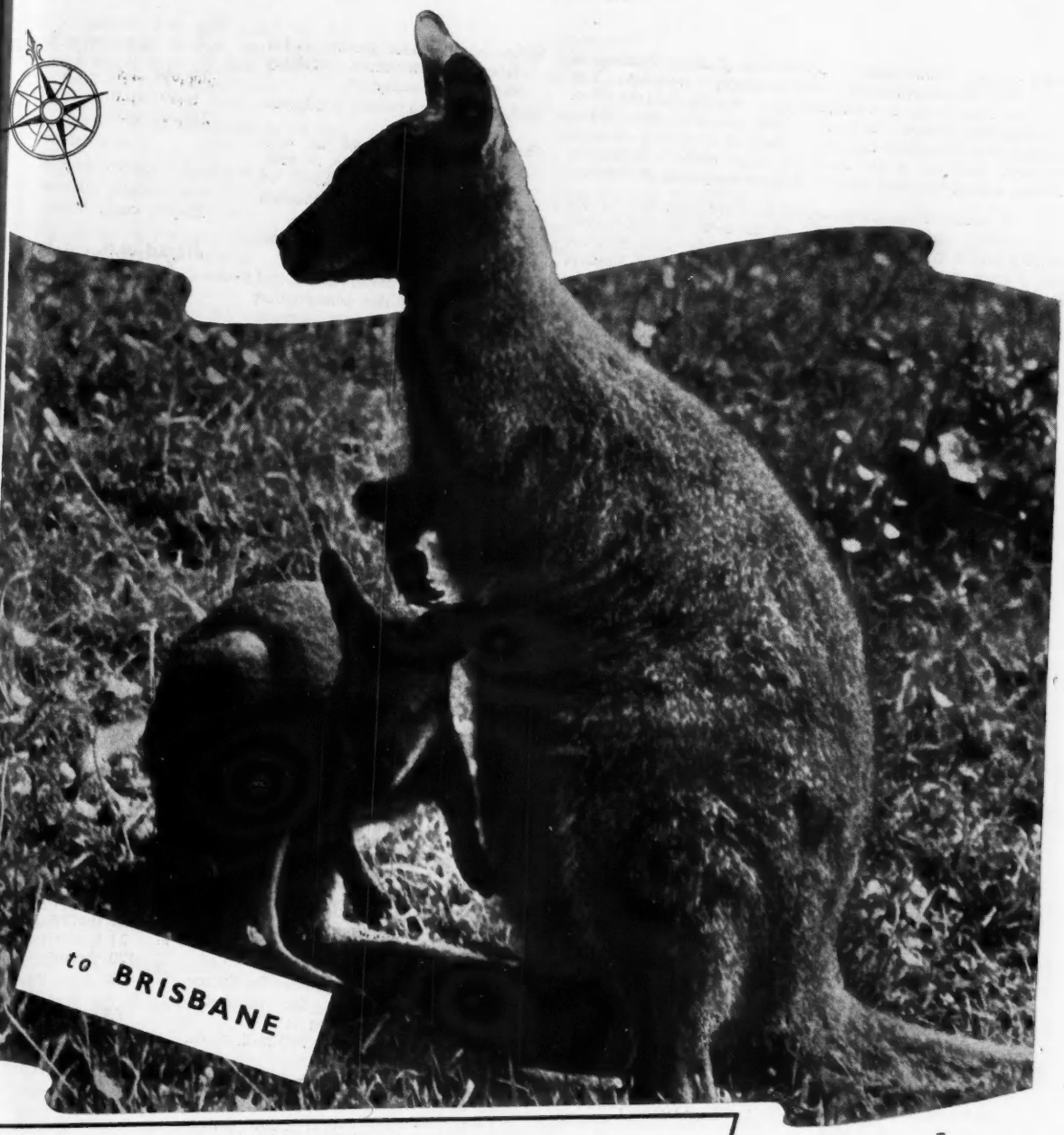

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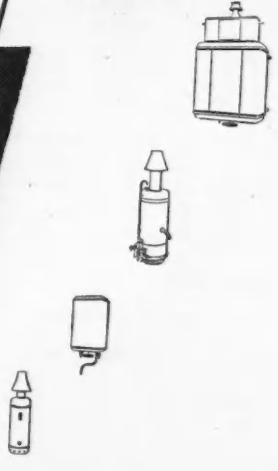

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demand, apart from catering, bread baking, street lighting, is over 10%, the maximum day will occur on a weekday. The domestic load being at its highest on a Sunday has the effect of giving the domestic demand a load factor of over 100%, relative to a maximum day where there is over 10% of non-industrial load. It is an interesting point which I personally did not appreciate until investigating consumptions in detail.

In our estimates of development we have provided for the non-domestic demand to be 50% of the total, so that in estimating future maximum days it is the weekday that concerns us. I have, therefore, taken the gas made on the 52 Sundays in Woburn Sands in 1950 from the total, and from the remainder found the average weekday for the year and equated this average with the maximum weekday. I then make the assumption that this equation holds good for domestic consumption up to 120 therms per consumer. 15% of the year's production in Woburn was consumed on the 52 Sundays of the year, and I have used the same relationship in the brief analysis I have added for the other districts. Tests carried out on the Oxhey estate showed that 17.3% of a week's gas was sent out on Sunday. This compares quite closely with the 15% of the whole year at Woburn Sands.

Woburn Sands

From gas production records I have obtained or deduced the following information:—

Number of consumers		881
The total production in 1950		28.0 mill. cu.ft.
Gas produced on 52 Sundays (15.0% of annual)	=	4.2 mill. cu.ft.
Production during 313 weekdays = 28.0 − 4.2	=	23.8 mill. cu.ft.
Average weekday production	=	76,000 cu.ft.
Maximum weekday consumption in 1950 = 1.26 of average weekday consumption.		96,000 cu.ft.

The essential deductions I have made from the above figures are that the maximum weekday of domestic consumption is 1.26% of the average weekday's consumption throughout the year, and that the total consumption on the 52 Sundays is 15.0% of the annual domestic demand.

The Oxhey estate is now analysed using the deductions made for Woburn.

Oxhey Estate

Domestic consumers		2,293
Average consumption per annum		137 therms
Space heating (assumed)		17 therms
Cooking, etc.		120 therms
15.0% used on 52 Sundays, say	=	21 therms
Consumed on 313 weekdays − 99 therms	=	19,800 cu.ft.
2,293 consumers at 19,800	=	45.5 mill. cu.ft.
Average weekday, cooking, etc. $\frac{45.5}{313}$	=	145,000 cu.ft.
Maximum weekday, cooking, etc., 145,000 × 1.26	=	183,000 cu.ft.
Consumption recorded by orifice type meter on January 29, 1951, when average temperature was 29°F.	=	234,000 cu.ft.
Difference assumed by space heating		51,000 cu.ft.
Annual heating load 17 therms × 2,293 consumers = 39,000 therms	=	7.8 mill. cu.ft.
Space heating on maximum day	=	0.66% of annual load
Space heating load factor	=	42%

Berkhamsted

Number of domestic consumers		3,500
Annual production		164.4 mill. cu.ft.
Average annual consumption per domestic consumer	=	168.5 therms
Assumed space heating	=	48.5 therms
Cooking, etc.		120 therms
Following the same process as for Oxhey the maximum weekday domestic consumption	=	238,000 cu.ft.
Add to bring to works conditions		10,000 cu.ft.
		248,000 cu.ft.
Domestic heating load at 48.5 therms per consumer = 34 mill. cu.ft. Take as Oxhey 0.66% of annual demand for maximum day	=	224,000 cu.ft.
Total produced for domestic use on maximum day		472,000 cu.ft.
Non-domestic demand 24.2% of total. 20% of this consumption is estimated by district manager to be space heating = 8.0 mill. cu.ft.		
Taking maximum day as 1.1% of annual	=	88,000 cu.ft.
		560,000 cu.ft.
Non-domestic process load by difference (load factor 64%)		137,000 cu.ft.
Maximum day		697,000 cu.ft.

While this may appear to be quite a reasonable analysis of the Berkhamsted load, I do not think it represents the true position. During the summer weeks Sundays at Berkhamsted were running at about 325,000 cu.ft. a day, whereas the domestic cooking, etc., load for the day was 248,000 cu.ft., a difference of 77,000 cu.ft. a day. It is obvious, looking through the Berkhamsted consumptions where for quite a long period of the year Sunday demands were equal to, if not greater than, the weekdays, that some of Sunday's load is non-domestic and a seven days a week load, probably commercial domestic and demands of that nature and of course catering which is included, would come under this heading.

Applying the same method to Watford shows up this position even more clearly.

Watford Group

No. of consumers		85,680
Annual production, 1950		3,989 mill. cu.ft.
Average consumption per consumer	=	141 therms
Space heating (assumed)	=	21 therms
Cooking, etc.		120 therms
Following the same process for Oxhey and Berkhamsted, the maximum weekday consumption is		6.85 mill. cu.ft.
Domestic space heating 360 mill. cu.ft., maximum day 0.66%		2.38 mill cu.ft.
Total		9.23 mill. cu.ft.
To bring to works conditions add		0.55 mill. cu.ft.
Total domestic		9.78 mill. cu.ft.
Non-domestic demand is 33.8% = 1,350 mill. cu.ft., of which from records 18% is space heating load.		
Non-domestic space heating 243 mill. cu.ft.		
Maximum day 1.1% of annual		2.67 mill. cu.ft.
Non-domestic process load by difference		3.15 mill. cu.ft.
Maximum day		15.60 mill. cu.ft.

On this basis the load factor of the non-domestic process demand is 96%, obviously an impossible figure, and I think for the same reason that there is a considerable maximum demand load on Sundays.

The following figures will emphasise this point:—

Annual production, 1950	3,989 mill. cu.ft.
Total of 52 Sundays	520 mill. cu.ft.
313 weekdays	3,469 mill. cu.ft.

If I assume 520 mill. cu.ft. to be domestic and further that Sunday loads are 15% of the year, I arrive at a total domestic consumption for the year of 3,470 mill. cu.ft. — 3,470 mill. cu.ft.

But the domestic consumption on the rental is only — 2,639 mill. cu.ft.

I have therefore analysed the consumption as follows:

Domestic consumption for year from rental	=	2,639 mill. cu.ft.
15% of year's rental assumed to be Sundays' domestic demand	=	396 mill. cu.ft.
Domestic demand, cooking, etc., for 313 days		2,243 mill. cu.ft.
Average domestic weekday consumption		7.20 mill. cu.ft.
Maximum weekday = average by 1.26 mill. cu.ft.	=	9.10 mill. cu.ft.
Domestic space heating 21 therms per consumer = 360 mill. cu.ft. maximum day at 0.66% of year	=	2.37 mill. cu.ft.
Difference cooking, etc.		6.73 mill. cu.ft.

Bringing these consumptions to works conditions:—

Maximum weekday, domestic cooking, etc.	7.13 mill. cu.ft.
Domestic heating maximum day	2.15 mill. cu.ft.
Total produced for domestic on maximum day	9.64 mill. cu.ft.

Non-domestic.

Total of 52 Sundays	520 mill. cu.ft.	
Domestic in total	396 mill. cu.ft.	
Non-domestic on Sundays	124 mill. cu.ft.	
Total non-domestic as 33.8% of year's production	= 1,350 mill. cu.ft.	
Less Sundays	124 mill. cu.ft.	
313 weekdays	1,226 mill. cu.ft.	
From Industrial Department's records 18% of total non-domestic is space heating.		
Sundays 18% of 124	= 22 mill. cu.ft.	
Weekdays 18% of 1,226 mill.	= 221 mill. cu.ft.	
If maximum day for heating is 1.1% of annual maximum weekdays, non-domestic heating demand is		2.43 mill. cu.ft.
Process load Sundays 124 − 22 = 102 mill. cu.ft.		
Process load weekdays 1,226 − 221 = 1,005 mill. cu.ft.		
Maximum day (weekday) process by difference		3.53 mill. cu.ft.
Maximum day, 1950		15.6 mill. cu.ft.

Load factor 3.53 for 1,005 mill. cu.ft. = 78%

This appears to be too high, but a better figure than when following the first method, and I think the latter approach is on the right lines, but, of course, capable of a further and better analysis.

If these deductions are used to ascertain the maximum day on one of the new towns the summary is as follows:—

New Towns

Population	60,000 persons
Number of houses at 3.5 persons per house	17,100
75% of these gas consumers	12,800
Domestic demand at 150 therms per annum = 30,000 cu.ft. of 500 B.Th.U. gas =	384 mill. cu.ft.
Non-domestic demand, equivalent to domestic =	384 mill. cu.ft.
Total annual demand	768 mill. cu.ft.

Domestic.

Taking on same basis as before: 120 therms per annum for cooking, etc., and therefore 30 therms per annum space heating.

Maximum day cooking, etc.	1.02 mill. cu.ft.
Maximum day space heating	0.78 mill. cu.ft.
Total domestic on maximum day	1.80 mill. cu.ft.

Non-domestic 384 mill. cu.ft.

Say 10% on Sundays	38 mill. cu.ft.	
On weekdays	346 mill. cu.ft.	
Say 20% space heating = 80 mill. cu.ft. at 1.1% of annual		0.88 mill. cu.ft.
Process load 266 mill. cu.ft., say 70% load factor		1.04 mill. cu.ft.
Maximum day at temperature of 30°F.		3.72 mill. cu.ft.
Potential maximum day at temperature of 19°F. approximately		4.00 mill. cu.ft.

Annual load factor 57%.

Addendum

Since writing this paper I have re-examined the analysis of Oxhey, Berkhamsted, and Watford, and now believe that 120 therms per annum per domestic consumer for demands other than space heating is too low. Working closely to the records obtained in the Oxhey Estate, I find that of the 137 therms per consumer, 129 for cooking, etc., and 8 therms for space heating is a much better estimate than 120 and 17 therms respectively. On this basis the space heating load factor is 28% and for the cooking, laundering, etc., load 81% on the maximum weekday. At Berkhamsted out of a total of 168.5 therms per consumer and taking 130 therms and 38.5 therms for cooking, etc., and space heating respectively, the load factor for domestic space heating is about 33%; for non-domestic process about 66%.

Maximum Weekday.		*Maximum Sunday.*	
Domestic.		*Domestic.*	
Cooking, etc.	7.1 mill. cu.ft.	Cooking, etc.	8.9 mill. cu.ft.
Space heating	2.0 „ „	Space heating	2.32 „ „
	9.1 „ „		11.22 „ „
Non-domestic.			
Space heating	2.6 „ „		
Process ...	3.9 „ „ (Load Factor, 71%)	Non-domestic	1.28 „ „
	15.6 mill. cu.ft.		12.50 „ „

The maximum day during the past winter occurred on a Friday; had this occurred on a Monday it is estimated that the domestic load would have increased to 9.4 mill. cu.ft. and the maximum day to 15.9 mill. cu.ft.

I am still a bit puzzled about the apparent high load factor for non-domestic process work. Taking the industrial and commercial process as a whole, is the average load spread fairly evenly over the year?

Taking the New Town on the same basis, 130 therms for cooking, etc., and 30 therms for space heating, the maximum day would be as follows:—

Domestic.

Cooking, etc.	1.1 mill. cu.ft.
Space heating	.5 „ „
Total domestic	1.6 „ „

Non-domestic.

Space heating	0.88 „ „
Process	1.04 „ „
Total at a temperature of 30°F.	3.52 „ „
Potential maximum day at 19°F.	3.87 „ „

I must here point out that these figures are on consumption and not production. There would, therefore, be an addition to make for unaccounted-for gas, temperature and pressure correction, etc.

DISCUSSION

Mr. J. H. Dyde (Senior Vice-President, I.G.E.) congratulated Mr. Evetts on so ably presenting his paper, which was the result of exhaustive study into the scientific estimation of gas demand. In the Eastern Gas Board area they were faced with very large development in the way of new housing. The Board naturally wanted some sort of plan as to how these new houses were to be supplied, where the production plant should be placed, where the gas should come from, the size of main, and the amount of capital expenditure involved. All this depended upon an accurate assessment of the gas demand. Quite a deal of work had already been done, and it was a matter of expanding it to include the larger area. To estimate the probable increase in population demanded the closest liaison with the local authorities and development corporations—and even the most confident estimates were still subject to national exigencies, such as the availability of building materials to meet the demand for housing. Again there was the question of the number of persons per dwelling; 3½ seemed an odd number but was one which had proved right in practice. They assumed that 75% of all new dwellings would use gas, and results tended to show that that assumption was correct. Mr. Dyde drew attention to the maximum demand figures which had been obtained on the L.C.C. Oxhey estate, which would be most useful in estimating the maximum demand in other similar housing schemes. The figure of 137 therms per annum closely accorded with the total for the same average number of persons in similar dwellings given by Mr. Everard. The maximum Sunday peak was 18.4 cu.ft. per hour. The figure of 9 cu.ft. for the maximum week-day was also very interesting. In so far as non-domestic consumption was concerned this was a much more difficult proposition, but estimates had been made from figures actually experienced.

The factory space heating load, continued Mr. Dyde, was a very unsatisfactory one. They had experience of this in Slough where after shutting down for the week-end, there was a tremendous demand first thing on Monday morning, which made things very difficult It was interesting to note that the domestic space heating load was so high; also that the process heating load in many factories was a very good one indeed. In some of the foodstuff factories the load was highest in the summer months and if there was much of this it would help to balance some of the more uneconomic types of space heating loads which they might have to take on in the winter. It was the final demand on the gasworks which really mattered.

With regard to gasholders in an integrated system, where one had an adequate proportion of water gas plant, Mr. Dyde considered that 12 hours' storage was a maximum sufficient for normal occasions. On the other hand, with isolated works having, say, stop-end horizontals 12 hours was totally inadequate. The question of dealing with unmeasured gas under conditions of continuous meter reading was one which was being referred to the Institution of Gas Engineers.

Mr. E. O. Rose (Divisional Engineer, Tottenham) said that they could not take the figures which Mr. Evetts had given for the Watford division and apply them indiscriminately elsewhere. He had come up against the same difficulty of estimating industrial sales, and he had tried to get at it in another way. By going back over periods as far as 1923 and making further comparisons he found that in 1948 the following were the figures of consumption in therms per head of population: Suburban districts, 54; country towns, 53; and rural areas, 51. This led him to the conclusion that, roughly speaking, men, women, and children accounted for as much gas whether they were working at home, in the factory, or at school—giving a figure which differed very little from that quoted by Mr. Evetts. The 54 therms was made up of 39 for domestic consumption and 15 for the share of factory or school catering.

Taking figures for new estates since the war—110 therms per consumer—it appeared that new consumers were using less gas than the old. As regards the daily demand, they arrived at a figure much the same as Mr. Evetts' which they called the 'maximum daily liability'—that was to say, the amount of gas they were liable to be called upon to send out at a temperature of 20°F. They were able to relate this to the total population, and it worked out at 0.258 therms per head of population per day (working on corrected gas outputs). If they worked on uncorrected gas outputs on a maximum day they were about 10% out.

Lt.-Col. J. A. Gould (Distributing Engineer, South Eastern Gas Board) said that few engineers had such large planning problems to deal with as had Mr. Evetts. The figure of 150 therms per future domestic consumer seemed a little optimistic, and he would have thought a figure of 120 more likely. It was a question of whether one was using the figure for deciding the gas-making and distribution plant required or for deciding the profit per therm which would be available to meet annual charges. He was interested in the estimate of future non-domestic demand being 40% of the total demand for the whole division and had compared it with the figures given in the Gas Council's recent report. Taking these figures in respect of two areas he found that in the West Midlands industrial gas sold, including public lighting, amounted to 46½% of the whole, and in the East Midlands 42% of the whole. The statement of the relationship which the maximum day bore to the year's sendout—*i.e.*, 1/228—agreed closely with the figure of 1/230 which was the experience of Colonel Gould's old company, the South Suburban.

The maximum hourly delivery per consumer of 18.4 cu.ft. agreed closely with his experience, and members would remember that he reported in a paper to the former Eastern District in 1947 the results of some tests made in respect of the peak rate consumption of some Portal estates—these averaging 19 cu.ft. Like Mr. Evetts, he had always used the figure of 20 cu.ft. per hour for planning purposes. Mr. Evetts gave figures showing the relationship between the maximum hour's demand and the instantaneous demand, which showed the latter to be about 7½% greater than the former. He had frequently measured peak rates which were 12% greater.

A Question of Prejudice

Sir George Evetts observed that Welwyn Garden City was going to own its electricity undertaking, and there was consequently a certain amount of prejudice against gas. They had asked for a bonus of 1d. per 1,000 cu.ft. of gas. He questioned the statement that from 7 p.m. till 7 a.m. gas stocks were static or rising. It was contrary to his experience that any gasholders remained static during that period.

Mr. G. E. Thomas (Industrial Gas Engineer, Watford Division, Eastern Gas Board) congratulated Mr. Evetts both on his choice of topic and the wide coverage given this problem bristling as it did with complexities. The range of non-domestic use covered a very wide field and a considerable variety of loads with their attendant characteristics of demand. The large scale space and central heating demand in itself varied considerably in three phases of application—domestic, commercial and industrial. The domestic central heating load offered a higher factor of use than that of industrial heating which also provided a higher factor than that of commercial heating.

In the Watford group—that was, the old Watford and St. Albans Gas Company—they, like many of the larger gas undertakings, divided consumers into four categories—domestic, commercial, industrial, bread baking, all the non-domestic consumers being classified according to the type and nature of industry or trade carried on. From the results of past years, they were able to ascertain where and to what extent developments were taking place. Apart from this classification of consumers, they were by virtue of the tariff structure in operation able to classify the loads developed both in industry and commerce—*e.g.*, gas consumed in industry for heating and catering would each be kept separate from that of the process heating load by separate metering arrangements. Similarly, gas used for large scale space or central heating with commercial and domestic consumers would be kept separate from the ordinary run of commercial and domestic uses. They derived immense benefit from this practice in being able to examine very closely the trend of development whether for heating, sundry commercial uses, or industrial process heating in each of their respective spheres.

It had also been the practice in the Watford group, continued Mr. Thomas, since the inception of a department dealing with industrial and commercial applications, to furnish the production engineer with regular monthly statements of a concise nature giving individual details of each new large-scale demand whether in the form of enquiry, order placed, or plant put into operation. In each of these instances the type of load would be specified with details of maximum hour, estimated daily, and estimated annual gas demands so that the production engineer would be acquainted with potential future demand, known future demand, and immediate new demand, together with details of locality where such demands would be loaded. Appended to each report would be a summary giving the

extent of demand in each year under the categories of industrial process heating, commercial use, and large-scale space and central heating loads.

An annual summary of these monthly reports was compiled, and from reference to summaries covering a period of years the production engineer had been able to arrive at a fairly reliable line of development in the respective spheres of demand already mentioned. In Mr. Thomas's opinion, it was only by close liaison between the industrial and commercial sales organisation and the production engineer, along lines similar to these, that it was possible to achieve some degree of accuracy in estimating. He felt it was essential that in assessing these demands they should be able to follow the trend of consumer needs in the three spheres mentioned—*i.e.*, industrial process, commercial use, and large-scale space and central heating. The load characteristics and the incidence of demand were so widely different that only by separating the spheres of gas usage was it possible to provide the production engineer with a clear picture of the nature and extent of supplies needed. As an outcome of this practice, they had hitherto been able to apply a great deal of the information so obtained to estimating the loads for new industrial estates in the new towns. They had also been able to compare these with estimates based on degree of saturation under the three load categories from records taken from industrial estates of similar character.

Dr. G. E. Foxwell referred to the suggestion that new housing was using 110 therms in comparison with 150 therms in older houses. This was a very important matter which if overlooked might miss some vital truth. In the first place, the Deputy Chairman of the Gas Council had recently stated that there were some two million out-of-date cookers still in use. That represented 700,000 tons of coal. New houses had new cookers which should be more economical in consumption. Also, new houses were equipped with more efficient solid fuel burning appliances of approved design.

Mr. H. S. C. Everard (Manager, Market Research, North Thames Gas Board) said that they had not found any diminution in the load when people moved into new property. For example, families from Stepney, averaging four persons and using 110 therms per annum, on moving into new accommodation used 130 therms with cooker and 220 therms with cooker and water heater. This was a very encouraging thing. Where the local authority installed gas water heaters it was found that gas cookers were used in 80% of the houses; but where electricity or coal was the means of water heating, then gas only got 65% of cookers. If they were dealing with an estate having solid fuel water heating, 75% gas cookers would be good, but with gas water heating they aimed at 80% with a reasonable chance of getting it. Increased demand was not related to coal shortage. People had a lot more money in their pockets than before the war, and increased load was related to that factor—not to the availability of coal. Some small consumers were hardly gas consumers at all, though they represented money invested in mains. An analysis of such small consumers showed 16% duplicated supplies; 10% communal bathrooms; 5% non-domestic standby; 21% old-age pensioners; 9% people living alone; 35% gas used a second fuel only; and 4% furnished rooms on main meters.

The Author's Reply

Mr. Evetts, replying to the discussion, said Mr. Dyde drew attention to the apparently high load factor of the non-domestic process demand in the examples given in the paper—particularly in the foodstuff factory where the load was highest in the summer months. While it would be dangerous to generalise on the results of three factories, the more one examined the non-domestic process load, one was led to conclude that the demand was very even throughout the year. It would not be unreasonable to assume that industrial production was lower during the winter than during the other periods of the year, due to a higher rate of illness among employees; and it had been stated that generally an employee's effort tended to be lower during the winter. These factors might influence the gas demand during the winter months. It was a line of investigation worth pursuing.

The Author agreed with Mr. Dyde that 12 hours' storage capacity was insufficient for a small isolated works making only coal gas. The theoretical storage required when making 100% of coal gas was 12 hours. This minimum, which was in effect the gas required from stock, included no provision for breakdown or to meet errors in prediction. If six average hours delivery was allowed to meet these eventualities, 18 hours' storage should be sufficient for a small works.

In reply to Mr. Rose, a considerable amount of thought was given to the non-domestic demand before deciding to make provision in the estimates for this load to be equivalent to the additional domestic demand. As pointed out in the paper, between 1936 and 1949 the non-domestic demand in the Watford Group had increased by 257% and during that time, of the total increase in gas sales, 43.2% was to non-domestic consumers. Further, in districts such as Welwyn Garden City and Letchworth Garden City, which were to be the pattern of the new development, the percentage of non-domestic sales was 69.8 and 47.2 respectively. An estimate of 50% was, he suggested, realistic.

While some engineers preferred to assess the gas demand in terms of demand per head of population, Mr. Evetts preferred to estimate the domestic and non-domestic loads separately. He was rather surprised that Mr. Rose found the consumption in suburban districts, country towns and rural areas approximately the same per head of population. The figure of 54 therms agreed with the present demand in the Watford Group where the non-domestic demand was 33.8% of the total, but in rural areas the total demand was only about 120 therms per consumer. If the average number of persons per household was four at the present time, this was equivalent to 30 therms per head. Mr. Rose was right in pointing out that the figures for the Watford Division could not be applied indiscriminately elsewhere. The domestic and non-domestic demand must be assessed for each area separately. The policy adopted by the local authority must have its effect on the gas demand.

In reply to Colonel Gould, Mr. Evetts said he was inclined to believe that the estimate of 150 therms per consumer per annum might prove to be high, but the figure of 120 therms per annum was low for the area they had under consideration.

On the subject of gasholder capacity Sir George Evetts questioned the statement that between 7 p.m. and 7 a.m. gasholders were steady or rising. He rather doubted if holders were at any time steady. In the Watford Group their gas stocks were to all intents and purposes steady between 7 p.m. and 8 p.m. During the maximum week in December, 1950, the variation in gas stock between 7 p.m. and 8 p.m. was equivalent to 1/18 of an hour's storage. On two days the tendency was to rise during these hours and on three days the tendency was to fall. Bearing in mind that the stocks were spread over 14 gasholders, he thought that his statement was substantially true for the Watford Group.

Mr. Thomas pointed out the importance of keeping reparate records of gas consumed in industry and commerce for heating, catering, etc., in order to supply the engineer with reliable information on which production and distribution could be based. The records kept in the Watford Group over a period of years had been invaluable, and it was hoped that in the future separate metering arrangements would be maintained for the various classes of consumption. Mr. Thomas said he was not quite sure what would prove an equitable basis for computing load factors which would convey the same information to the production engineer as it would to the industrialist. Mr. Evetts suggested that the respective problems were not the same. The gas engineer required to know the load factor of his gas-making plant and distribution system, whereas the industrialist would presumably think in terms of throughput of his plant related to consumption of fuel per article or per operation. Unless he was incurring a maximum demand charge, the rate of fuel consumption would not interest him.

The figures quoted by Mr. Stirling Everard were most interesting, particularly those relating to the percentage of gas cookers in use with various types of water heating appliances. The engineer was concerned with the consumer in bulk and it would be most useful if Mr. Everard could state the percentage of households choosing the various types of appliances. One looked forward to the time when the market research department would provide the engineer with detailed estimates of the gas demand. Mr. Everard considered that the increased consumption was due to more money in the consumer's pocket and not to the shortage of solid fuel. One would hesitate to disagree with so authoritative a source of information, but from time to time reports had been received from fitters and collectors that householders would light up the gas cooker to keep warm when they were out of coal, and the Gas Council's Press Summary of April 16 quoted an extract from a letter written to the *Evening News* by a Wandsworth collector saying the same thing. The increase in consumption between 1943 and 1946 was so marked that he felt it was more than a coincidence that during the same period a fuel shortage made its appearance.

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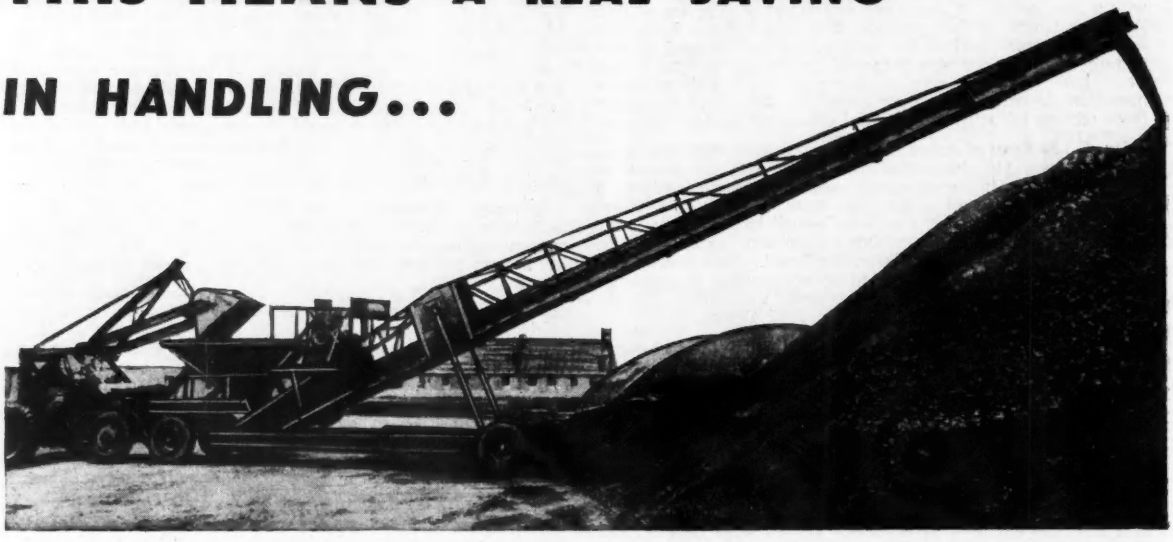

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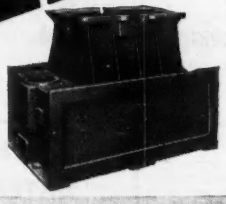

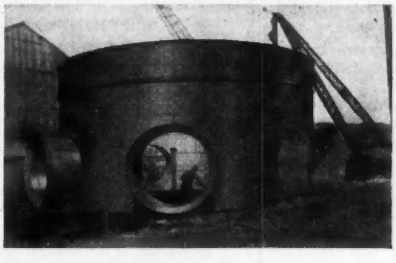

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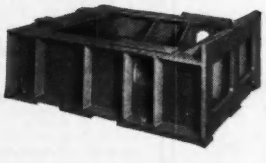

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WELDING SPECIALISTS

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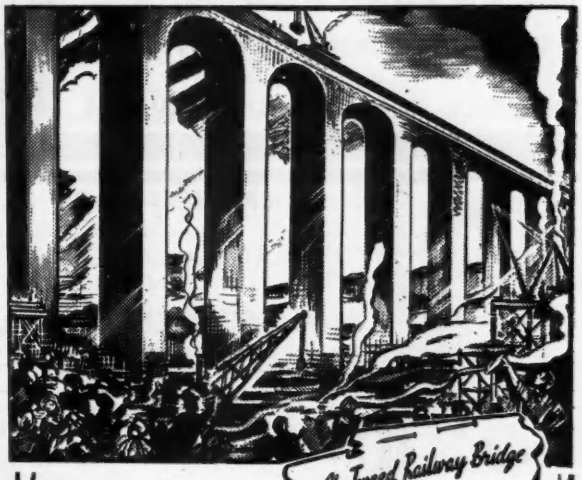
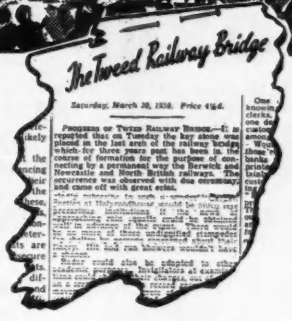


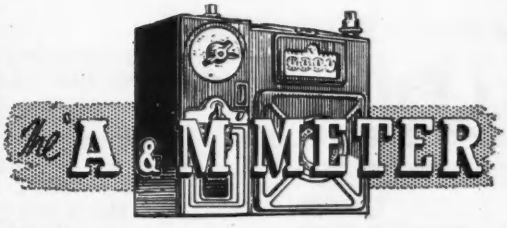

The Tweed Railway Bridge

Saturday, March 30, 1850. Price 4½d.

PROGRESS OF TWEED RAILWAY BRIDGE.—It is reported that on Tuesday the key stone was placed in the last arch of the railway bridge which for three years past has been in the course of formation for the purpose of connecting by a permanent way the Berwick and Newcastle and North British railways. The occurrence was observed with due ceremony, and came off with great eclat.

Excerpt from "THE SCOTSMAN," Saturday, March 30, 1850.

100 YEARS may be but a fleeting moment in the history of mankind, but it is a long span in the history of a Company. During these past 100 years the firm of Alder & Mackay has met and bridged many obstacles. Sometimes the bridging has been done over the human valleys of death and despair in peace and war—at other times over the mountainous realms of scientific research. **To-day the keystone of this 100 Years' bridge is there for all to see —the integrity of the Measure of Accuracy.**



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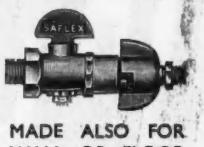
OUR **IMPROVED** PATENT **"SAFLEX"** PLUG-IN COCK TO SUIT ALL PORTABLE GAS APPLIANCES WASH BOILERS &c.



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EDUCATIONAL

THE INSTITUTION OF CHEMICAL ENGINEERS.
27TH ASSOCIATE MEMBERSHIP EXAMINATION.

APPLICATION forms (returnable June 1, 1951 and particulars of the 27th Associate Membership Examination may be obtained from the Hon. Registrar, Institution of Chemical Engineers, 56, Victoria Street, Westminster, London, S.W.1. NOTE.—Written and oral examinations will be held in September, 1951. Home Papers will be issued in January, 1952.

PUBLICATIONS

GAS ACCOUNT CALCULATORS SUPPLIED either by Price per Therm or Thousand, for any specified Calorific Value, in book form, office charts, or pocket charts for Meter Inspectors, printed in clear type. Write for particulars to F. H. WAKELIN, LTD., Calculator Specialists, 354, WHEELER STREET, BIRMINGHAM.
'Phone: Northern 0989. 'Grams: Reckoners, B'ham.

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APPOINTMENTS VACANT

SCOTTISH GAS BOARD

NORTHERN DIVISION.

APPLICATIONS are invited from suitably qualified persons for the following posts:—

I. ABERDEEN DISTRICT.
(*a*) PRODUCTION ENGINEER experienced in mechanical engineering and in the operation, control and maintenance of Gas Works plant, the preparation of plans and specifications and in the control of staff and workmen. The candidate selected will be required under the District Manager to assume responsibility for the day to day control of the works of the Undertaking.
(*b*) JUNIOR TECHNICAL ASSISTANT with engineering and drawing office experience and a knowledge of Chemistry. Previous Gas Works experience will be an advantage.

II. ELGIN DISTRICT.
JUNIOR TECHNICAL ASSISTANT—Experience as in I (*b*) above.

III. FRASERBURGH DISTRICT.
JUNIOR TECHNICAL ASSISTANT—Experience as in I (*b*) above.

Applicants for the position of Production Engineer must be Corporate Members of one or other of the Institutions of Civil, Mechanical or Gas Engineers.

The salary scales for the above posts are in accordance with the Board's Scale of Salaries for adult Administrative, Professional and Technical Staffs, viz.:—
I (*a*) Provincial "A" Grade XII—£645–£770.
I (*b*) Provincial "A" Grades II-VI—£250–£495.
II & III Provincial "B" Grades II-VI—£235–£480.
Placing in the scale will in each case be in accordance with qualifications and experience.

Candidates, who may be required to undergo a medical examination, should state whether they meantime hold a superannuated position.

Applications giving full particulars of age, qualifications and experience, together with *copies* of three recent Testimonials, should be lodged with the undersigned not later than Monday, May 14, 1951.

H. S. MILNE,
Divisional Controller.

50, Cotton Street,
Aberdeen,
April 20, 1951.

PUBLISHERS' NOTICE

The "Gas Journal" is published every Wednesday, price 1/-; by post 1/2d.

NEW SUBSCRIPTION and CLASSIFIED ADVERTISEMENT RATES OPERATING FROM JAN. 1, 1951.

Subscription Rates: Home and Empire :- 52/- per annum; Foreign :- 60/- per annum. (Both payable in advance.) A copy of the "Gas Journal" Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words) - minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10" deep x 7" wide; block screen 120.

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS OFFICE: 10, Union Street, Birmingham.

NORTHERN MANAGER: W. Q. Foster, 33, St. Helens Road, Harrogate. 'Phone: Harrogate 84291.

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Telephone: CENtral 2236-7. Telegrams: Gasking, Fleet, London.

APPOINTMENTS VACANT (*ctd.*)

NORTH WESTERN GAS BOARD

MANCHESTER GROUP.
DEPUTY SALES AND SERVICE OFFICER (GAS).

APPLICATIONS from suitably qualified persons are invited for the above post at a salary of £1,000 per annum.

Applicants should have wide experience in the development of gas sales and the organisation of consumer service, including the installation and maintenance of gas appliances.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications, appropriately endorsed, furnishing personal details and information as to training, experience and qualifications, together with the names of two referees should be addressed to the General Manager, North Western Gas Board (Manchester Group), Town Hall, Manchester, within fourteen days from the publication of this advertisement.

NORTH WESTERN GAS BOARD

BURNLEY/COLNE GROUP.
TECHNICAL ASSISTANT (DISTRIBUTION).

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT (DISTRIBUTION) to the Burnley/Colne Group.

The successful applicant will be responsible to the Group Distributing Engineer and will be required to work in conjunction with the District Distributing Engineers in the preparation of schemes for the modification or extension of the existing mains network and the proposed grid main.

Applicants should have had practical experience of the type of work called for, and should possess the Higher Grade Certificate (Gas Engineering—Supply) of the Institution of Gas Engineers or its equivalent.

The commencing salary will be within the range of £415-£495 per annum (Grade A.P.T. VI of the National Salary Scales) according to experience and qualifications.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications, suitably endorsed and giving personal details, particulars of training, qualifications and experience, together with the names and addresses of two referees, should reach the General Manager, North Western Gas Board (Burnley/Colne Group), Parker Lane, Burnley, not later than twelve days after the publication of this advertisement.

NORTH WESTERN GAS BOARD

FYLDE GROUP
INDUSTRIAL ENGINEER.

APPLICATIONS are invited for the above appointment at a salary within Grade A.P.T. IX of the National Salary Scales (£520-£620 per annum).

Applicants should have had experience in the installation and operation of large scale catering and industrial gas appliances and possess the Higher Grade Certificate of the Institution of Gas Engineers (Supply) or equivalent qualification.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications, appropriately endorsed, giving personal details and particulars of training, experience and qualifications, together with the names of two referees, should reach the General Manager, North Western Gas Board (Fylde Group), Princess Street, Blackpool, not later than twelve days following the publication of this advertisement.

NORTH WESTERN GAS BOARD

KENDAL GROUP.
HOME SERVICE ADVISER.

APPLICATIONS are invited for the above position.

Candidates should be qualified in Domestic Science and be experienced in the use of Domestic Cooking and Heating Appliances and in organisation of Cookery Demonstrations, lectures and district home service calls.

The commencing salary will be within Grade A.P.T. V (Provincial "B"—Female) of the National Salary Scales (£296-£360 per annum).

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications suitably endorsed stating age, qualifications and experience, together with *copies* of two recent Testimonials should reach the General Manager, North Western Gas Board (Kendal Group), Gas Works, Kendal, not later than fourteen days after the publication of this advertisement.

NORTH WESTERN GAS BOARD

KENDAL GROUP.
DISTRICT DISTRIBUTING ENGINEER: KENDAL DISTRICT.

APPLICATIONS are invited for the above position.

The successful applicant will be responsible to the Group Distributing Engineer for all aspects of the distributing of gas including the control of mainlaying staff and the supervision of mainlaying work carried out by Contractors within the District, together with the preparation of schemes for extension or modification of the existing mains network.

Applicants should have had practical experience and should possess the Higher Grade Certificate (Gas Engineering—Supply) of the Institution of Gas Engineers.

The salary will be within the range of Grade A.P.T. VII (Provincial "B") of the National Salary Scales (£435-£515 per annum) according to experience and qualification.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications endorsed "District Distributing Engineer," stating age, education, qualifications and experience, together with the names of two persons to whom reference may be made, should reach the General Manager, North Western Gas Board (Kendal Group) Gas Works, Kendal, not later than twelve days after the publication of this advertisement.

NORTH WESTERN GAS BOARD

BURNLEY/COLNE GROUP.
DEPUTY STATION ENGINEER—BRIERFIELD WORKS.

APPLICATIONS are invited for the position of DEPUTY STATION ENGINEER at the Brierfield Gas Works, Nelson, at a salary within Grade A.P.T. VIII of the National Salary Scales (£490-£570 per annum).

Candidates should possess the Higher Grade Certificate of the Institution of Gas Engineers and preferably should have experience in the control of Vertical Retorts and Carburetted Water Gas Plants.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications, appropriately endorsed, and giving personal details, particulars of training, qualifications and experience together with the names of two referees, should reach the General Manager North Western Gas Board (Burnley/Colne Group) Parker Lane, Burnley, not later than fourteen days after the publication of this advertisement.

NORTH WESTERN GAS BOARD

BLACKBURN GROUP.
SENIOR SALESMAN—BLACKBURN SHOWROOMS.

APPLICATIONS are invited from suitably qualified persons for the above post.

Applicants must have had experience of Showroom supervision and sales, and preference will be given to holders of the Institution of Gas Engineers' Certificate in Gas Salesmanship and Consumer Service.

The salary will be within Grade A.P.T. VI of the National Salary Scales (£415/£495 per annum).

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications, furnishing personal details together with training, experience and qualifications and giving the names of two referees, should be forwarded to the General Manager, North Western Gas Board (Blackburn Group), Cardwell Place, Blackburn, within fourteen days of the publication of this advertisement.

NORTH WESTERN GAS BOARD

PRESTON GROUP.

APPLICATIONS are invited for the following positions :—

1. CHIEF CHEMIST—LOSTOCK HALL WORKS, PRESTON.
   The salary will be within Grade A.P.T. X of the National Salary Scales (£570-£670 per annum) according to experience and qualifications. A house is available at a reasonable rent.
   Preferably, applicants should be Gasworks trained and be members of an appropriate professional body or possess a University degree.
   The successful applicant will be responsible to the Station Engineer for the chemical control of production and ancillary plant, and for conducting any special investigations.
2. DEPUTY STATION ENGINEER—CHORLEY WORKS.
   The salary will be within Grade A.P.T. VIII of the National Salary Scales (£490-£570 per annum) according to experience and qualifications.
   Applicants should possess the Higher Grade Certificate (Gas Manufacture) of the Institution of Gas Engineers and have received a thorough training in all branches of gas manufacture. Experience of Glover-West Vertical Retorts and C.W.G. plants will be an advantage.
   The successful applicant will be responsible to the Station Engineer for the general supervision of all the activities carried out on the works, including the control of labour.
3. JUNIOR TECHNICAL ASSISTANT—CHORLEY WORKS.
   The salary will be within Grade A.P.T. III of the National Salary Scales (£250-£400 per annum) according to age and experience.
4. JUNIOR TECHNICAL ASSISTANT—LEYLAND WORKS.
   The salary will be within Grade A.P.T. III of the National Salary Scales (£250-£400 per annum) according to age and experience.
   Applicants for positions 3 and 4 should not be less than 21 years of age and should have had the necessary chemical training and experience to enable them to carry out routine Laboratory and Plant Chemical tests.
   The successful applicants may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications, stating age, qualifications and experience together with the names and addresses of two referees should reach the General Manager, North Western Gas Board (Preston Group), 108, Fishergate, Preston, not later than fourteen days after the publication of this advertisement.

(*Classified advertisements continued on Supplement 4*)

APPOINTMENTS VACANT (ctd.)

GAS Holder erection FOREMEN and CHARGE-HANDS wanted for contracts in the Midlands and Wales. Full details of experience and rates to No. 9961, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

EASTERN GAS BOARD

NORWICH DIVISION.
CHEMIST FOR MOBILE LABORATORY.

APPLICATIONS are invited for the position of CHEMIST to take charge of a Mobile Laboratory which will serve the small and medium sized Works in the Norwich Division.

The commencing salary will be within the range of Provincial "A," Grade A.P.T. VI of the National Salary Scales.

Candidates should have a sound practical and theoretical knowledge of chemistry; be capable of carrying out all standard Gas Works tests and be able to apply the results to Works practice. They should have completed their period of National Service.

The successful applicant will be required to drive and be responsible for the Mobile Laboratory and the appointment will be based on the Divisional Headquarters at Norwich. The position will provide excellent opportunities for broadening the experience of the person appointed and prospects of promotion may not be confined to the chemical side.

Applications, stating all relevant details, together with the names of two referees should be sent to the undersigned within fourteen days of the appearance of this advertisement.

RONALD A. WESTON,
General Manager,
Norwich Division.

Eastern Gas Board,
Norwich Division,
Gas Works,
Bishop Bridge,
Norwich.
February 19, 1951.

EAST MIDLANDS GAS BOARD

MAIN AND SERVICE LAYER required. J.I.C. conditions and rates of pay.—Applications to be addressed to D. L. Birchmore, Local Manager, East Midlands Gas Board, Gas Works, Louth.

EAST MIDLANDS GAS BOARD

LEICESTER AND NORTHANTS DIVISION.
LEICESTER UNDERTAKING.
DISTRICT ENGINEER—(MAINS)
DISTRIBUTION DEPARTMENT.

APPLICATIONS are invited for the position of DISTRICT ENGINEER in the Distribution Department of the Leicester Undertaking. The Leicester area of supply is divided into two districts, each of which is controlled by a District Engineer responsible to the Distribution Engineer.

Applicants should possess the Higher Grade Certificate of the Institution of Gas Engineers in Gas Engineering (Supply), and should have good practical experience in all branches of distribution work. They should be capable of assuming complete responsibility for laying of mains and services in the district, for control of gas pressures, and also be capable of assisting the Engineer in the planning of new development schemes.

The post is graded in Grade A.P.T. VII of the National Salary Scales (salary range £450-£530 per annum), and the commencing salary will be in accordance with the capabilities and experience of the applicant.

The successful candidate will be required to pass a medical examination and the appointment will be subject to the provisions of any Superannuation Scheme which may be adopted by the Board.

Applications in writing giving age, qualifications, experience and other details should be submitted to the undersigned to arrive not later than April 26, 1951.

C. C. WOOD,
Divisional General Manager.

Gas Offices,
Millstone Lane,
Leicester.
April 11, 1951.

EAST MIDLANDS GAS BOARD

NOTTS. AND DERBY DIVISION.
GAS ENGINEERING DRAUGHTSMEN.

VACANCIES exist for GAS ENGINEERING DRAUGHTSMEN in the Divisional Drawing Office, Derby.

Applicants should have had experience with either a large Gas Undertaking or a Gasworks Plant Contractor, in the design, layout and detailing of plant and equipment for the production and distribution of gas.

The commencing salary will be according to experience and ability and within the range of £450-£530 per annum, Grade A.P.T. VII of the National Salary Scales for the Gas Industry. The successful candidates will be required to pass a medical examination and to subscribe to such superannuation scheme as the Board may adopt in the future.

Applications stating age, qualifications, taining and experience, together with the names of two referees, should be submitted to the undersigned not later than fourteen days from the publication of this advertisement.

K. L. PEARCE,
Divisional General Manager.

Notts. & Derby Division,
Friar Gate,
Derby.
April 9, 1951.

EAST MIDLANDS GAS BOARD

LEICESTER AND NORTHANTS DIVISION.
JUNIOR TECHNICAL ASSISTANT—
LOUGHBOROUGH GROUP.

APPLICATIONS are invited for the position of JUNIOR TECHNICAL ASSISTANT with the Loughborough Group of Undertakings.

Applicants should be conversant with the control and operation of all Gas Works plant and be able to carry out routine testing. Experience in the operation of Woodall-Duckham vertical retorts will be an advantage.

The commencing salary will be within the range of A.P.T. Grade IV of the National Salary Scales (£250-£420 per annum) according to age and experience. The successful applicant will be required to pass a medical examination and the appointment will be subject to such Superannuation Scheme as may be adopted by the Board.

Applications, stating age and experience and giving full details of training and qualifications, together with the names of two referees, should be addressed to the undersigned to be received not later than April 28, 1951.

C. C. WOOD,
Divisional General Manager.

Gas Offices,
Millstone Lane,
Leicester.
April 11, 1951.

EAST MIDLANDS GAS BOARD

NOTTS. AND DERBY DIVISION.
HEANOR DISTRICT.
APPOINTMENT OF DISTRICT MANAGER.

APPLICATIONS are invited for the position of DISTRICT MANAGER of the Heanor District which includes the following undertakings:—

Heanor and Langley Mill, Alfreton, Riddings and Ripley.

The commencing salary will be £800 per annum.

Applicants should possess the Higher Grade Certificate in Gas Engineering (Supply) or other equivalent qualification and should have administrative experience.

The person appointed will be responsible for distribution staffs and for the general administration of the District, including sales development and the organisation of sales and service.

The appointment will be subject to such superannuation scheme as may be adopted by the Board, and the successful applicant may be required to pass a medical examination.

Applications, stating age, and giving details of education and training, qualifications, present position and previous experience, together with the names of two referees should be sent to the undersigned to be received not later than fourteen days after the publication of this advertisement.

A. GWYNNE DAVIES,
Secretary.

Beverley House,
University Road,
Leicester.

EAST MIDLANDS GAS BOARD

TECHNICAL ASSISTANT.
NOTTS. AND DERBY DIVISION.

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT on the staff of the Divisional Engineer at a commencing salary which will be according to experience and qualifications but within the range of £645-£770 per annum. Grade XII National Salary Scales.

The successful applicant will be responsible to the Divisional Engineer for keeping technical statistics, the operation of the Divisional Gas Grid, standardisation of technical procedure, and for carrying out special investigations in the operation of plant at any of the Works of the Undertakings within the Division.

Applicants should possess the higher grade certificate of the Institution of Gas Engineers or hold an equivalent qualification. Experience in a similar position at a large Gasworks or Coke Oven Plant would be an advantage.

The successful applicant will be required to undergo a medical examination, and the appointment will be subject to such superannuation scheme as the Board may adopt in the future.

Applications stating age, qualifications, present position and previous training and experience, together with the names of two referees, should be sent to the undersigned to be received not later than fourteen days from the appearance of this advertisement.

K. L. PEARCE,
Divisional General Manager.

Notts. and Derby Division,
Friar Gate,
Derby.

EAST MIDLANDS GAS BOARD

CONSTRUCTIONAL
ENGINEERING ASSISTANT.
NOTTS. AND DERBY DIVISION.

APPLICATIONS are invited from qualified Engineers for the position of CONSTRUCTIONAL ENGINEERING ASSISTANT to the Divisional Engineer at a commencing salary which will be according to experience and qualifications but which will not be less than £800 per annum.

The successful applicant will be responsible for drawing up specifications and the supervision of drawing office work in connection with projects for extensions and reconstruction of Gasworks within the Division, and for general inspection and the oversight of the projects during the construction stage.

Applicants should have received sound engineering training and have had considerable experience either in a large Gasworks or with a contractor specialising in constructional engineering.

The successful applicant will be required to undergo a medical examination, and the appointment will be subject to such superannuation scheme as the Board may adopt in the future.

Applications stating age, qualifications, present position and previous training and experience, together with the names of two referees, should be sent to the undersigned to be received not later than fourteen days from the appearance of this advertisement.

A. GWYNNE DAVIES,
Secretary.

Beverley House,
University Road,
Leicester.

NORTHERN GAS BOARD

CARLISLE DIVISION.
TECHNICAL ASSISTANT.

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT to the Carlisle Unit.

Applicants should be competent to control all gas works plant including Vertical Retorts, and have Drawing Office experience.

The appointment will be subject to the Conditions of Service set out in the Agreement of the National Joint Council for Gas Staffs, and the salary will be within Grade A.P.T. VI.

Applications, with the names of two referees, should be sent to the undersigned not later than Wednesday, May 16, 1951.

J. G. AITKEN,
Divisional General Manager.

Gas Works,
Rome Street,
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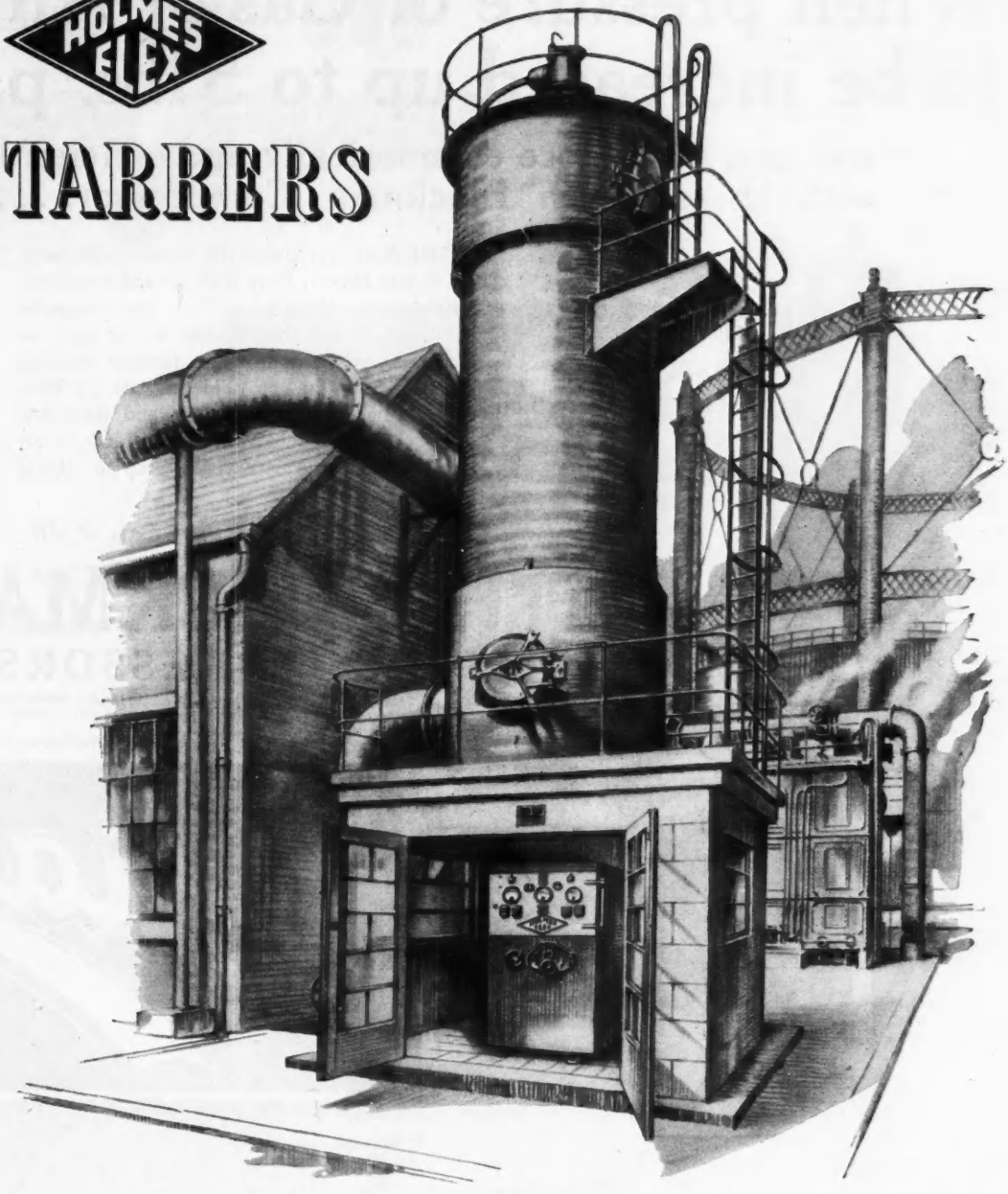

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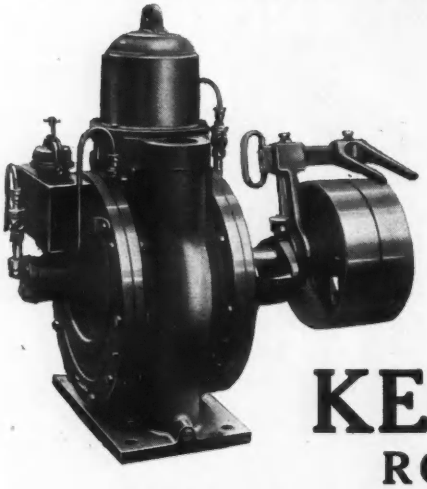

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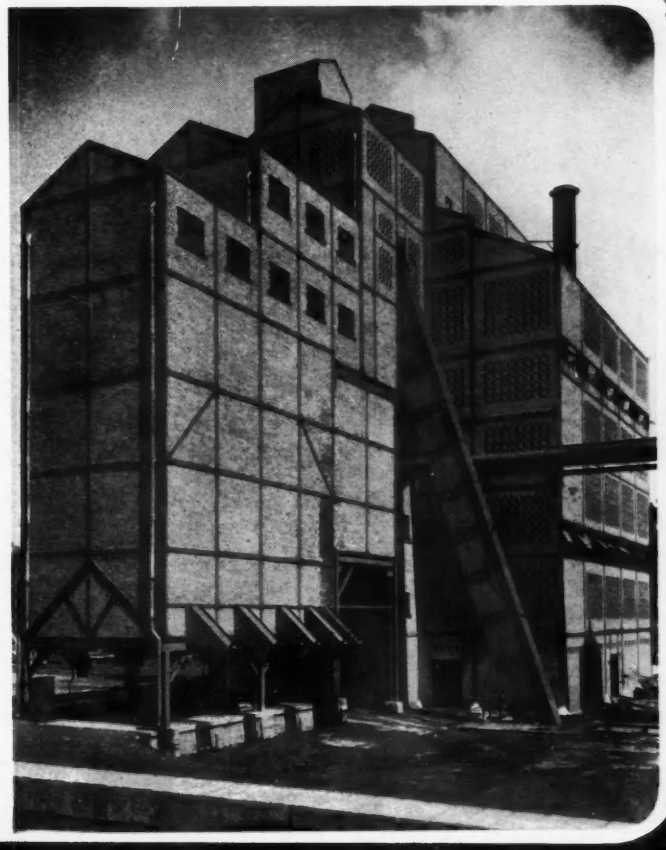

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